

07-28-00

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ATTY DOCKET NO.: NC056-US1/5487-81

DATE: July 27, 2000

**UTILITY PATENT APPLICATION TRANSMITTAL LETTER
AND FEE TRANSMITTAL FORM (37 CFR 1.53(b))**



BOX PATENT APPLICATION
Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Transmitted herewith for filing under 37 CFR 1.53(b) is:

a patent application
 a Continuation a Divisional a Continuation-in-Part (CIP)
of prior application no.: ; filed
 A Small Entity Statement(s) was filed in the prior application; Status still proper and desired.

Inventor(s) or Application Identifier:

Julian Mullaney, William Alan Carrico, Randy Duaine Wilkinson

Entitled: **TERMINAL BLOCKS AND METHODS FOR MAKING AND BREAKING
CONNECTIONS IN A TELECOMMUNICATION CONDUCTOR**

Enclosed are:

1. Application Transmittal Letter and Fee Transmittal Form (*A duplicate is enclosed for fee processing*)
2. 55 pages of Specification (including 70 claims)
3. 26 sheets of Drawings (35 USC 113)
4. Oath or Declaration
 - a. newly executed (*original or copy*)
 - b. copy from prior application (37 CFR 1.63(d) (*for continuation/divisional*) [Note Box 5 Below])
 - c. DELETION OF INVENTOR(S) (*Signed statement deleting inventor(s) named in the prior application*)
5. Incorporation By Reference (*useable if box 4b is checked*)
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. Microfiche Computer Program (*Appendix*)
7. Assignment papers (*cover sheet(s) and document(s)*)
8. Small Entity Statement(s)
9. Information Disclosure Statement, PTO-1449, and references cited
10. Preliminary Amendment (**Please enter all claim amendments prior to calculating the filing fee.**)
11. English Translation Document
12. Certified Copy of Application No. ; Filed

13. Sequence Listing/ Sequence Listing Diskette

- a. computer readable copy
- b. paper copy
- c. statement in support

14. An Associate Power of Attorney

15. Return Receipt Postcard (MPEP 503) (Should be specifically itemized)

16. Other:

The fee has been calculated as shown below:

	Column 1 No. Filed	Column 2 No. Extra	Small Entity Rate	Large Entity Rate
BASIC FEE			\$345.00	\$690.00
TOTAL CLAIMS	70 - 20 =	50	x 09 = \$	x 18 = \$ 900.00
INDEP CLAIMS	7 - 3 =	4	x 39 = \$	x 78 = \$ 312.00
<input type="checkbox"/> MULTIPLE Dependent Claims Presented			+ 135 = \$	+ 270 = \$
<i>If the difference in Col. 1 is less than zero, Enter "0" in Col. 2</i>		Total	\$	Total \$1,902.00

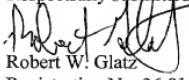
A check in the amount of **\$ 1,942.00** is enclosed to cover the filing fee, PLUS the Assignment Recordation fee (\$40.00).

The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 50-0220.

Any additional filing fees required under 37 CFR 1.16.

Any patent application processing fees under 37 CFR 1.17.

Respectfully submitted,



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Express Mail Label No. EL533613680US

Date of Deposit: July 27, 2000

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Michele P. McMahan Date of Signature: July 27, 2000

**TERMINAL BLOCKS AND METHODS FOR MAKING AND BREAKING
CONNECTIONS IN A TELECOMMUNICATIONS CONDUCTOR**

Field of the Invention

The present invention relates generally to telecommunications and, more particularly, to connecting devices and methods for connecting 5 telecommunications conductors.

Background of the Invention

Terminal blocks are used by telecommunications companies to connect 10 connector wires of a multi-core cable to service wires that extend to customer residences or places of business. Such terminal blocks are typically mounted outdoors and are, thus, exposed to environmental conditions, such as rain, snow, sleet, ice, temperature fluctuations, dirt, insect infestation and similar conditions that may adversely affect the electrical connections between the service wires and the electrical connectors. Thus, some form of sealant material may be provided in 15 such terminal blocks.

Referring now to the schematic illustration of **FIG. 1**, a typical telephone company (Telco) telecommunications conductor cable 20 extends from the Telco central office 22 to feed pedestals in a neighborhood or neighborhoods. The Telco telecommunications conductor cable 20 may include as many 900 or more pairs of 20 telecommunications conductor wires. At a splice 24, one or more of the pairs of

telecommunications wires are accessed. **FIG. 1** illustrates a single tip line **26** and ring line **28** which are spliced at the splice **24** into a cable extending to pedestal **32**. Note that, while only one pair of wires **26, 28** is illustrated, the splice typically includes bridge connections for 25 pairs of wires with a 25 pair cable **30** extending from the splice **24** to the pedestal **32**. Thus, the telecommunications wire pair **26, 28** and the other 24 pairs which are bridge connected to the pedestal **32** also continue to extend within the telecommunications conductor cable **20** and are, therefore, available for use at additional pedestals further downstream from the Telco central office **22**.

10 In the pedestal **32**, the telecommunications wire pair **26, 28** is connected to a terminal block **34**. It is further to be understood that, while only one terminal block **34** is illustrated, a terminal block assembly including a plurality of module stations, which may share a common base, is typically provided for all the pairs of the cable **30**. The terminal block **34** provides a connection point between 15 telecommunications wire pair **26, 28** and the customer service wires **36**. A telecommunications connection may thus be provided between the customer **38** and the Telco central office **22**. In addition, by utilizing a bridge connection at the splice **24**, the telephone company maintains the flexibility of using ones of the pairs of wires in the telecommunications conductor cable **20** at different pedestals 20 **32** depending upon customer requirements at various locations within a neighborhood or neighborhoods.

An example of terminal blocks **34** according to the prior art is described in United States Patent No. 5,557,250 entitled "Telecommunications Terminal Block" which is incorporated herein by reference as if set forth in its entirety. 25 Telecommunications terminal blocks may also be utilized for establishing a connection between internal wiring of the customer **38** and the customer service wires **36**. An example of such a telecommunications terminal block is described in United States Patent No. 5,423,694 entitled "Telecommunications Terminal Block" which is incorporated herein by reference as if set forth in its entirety.

The telecommunications infrastructure as described with reference to **FIG. 1** is generally directed to providing conventional voice services to a plurality of customers **38**. The conductors **20, 26, 28, 36** are typically copper wires well suited to supporting voice communications. With the increased popularity of data based communications, which are typically digital transmissions, additional demands are being placed on the telephone infrastructure. For example, the Internet is growing increasingly popular with expanding information and services available to customers utilizing the Internet. The increase in content and opportunity for utilization of the Internet further may make it desirable to provide increasing data rates for communications over the telephone infrastructure.

While conventional modems designed for use over the telephone infrastructure are suited to the systems described with reference to **FIG. 1**, they are typically limited in their communication rate, for example, to 56 kilo bits per second (kbps). More recently, the digital subscriber line (DSL), very high data rate **15** DSL (VDSL), asymmetrical DSL (ADSL) and other DSL technologies have been proposed for bringing higher band width information communications to homes and small businesses over ordinary copper telephone lines such as the cable infrastructure illustrated in **FIG. 1**. The DSL approach is intended to provide downstream communications connections at data rates from approximately 1.544 **20** megabits per second (mbps) through 384 kbps. However, the data rate available for any individual customer **38** may depend upon a variety of characteristics of the Telco infrastructure including the distance between the customer **38** and the Telco central office **22**. The unused length of a customer's telecommunication wire pair, such as pair **26, 28**, extending downstream from the splice **24** may further limit the **25** data rate available to individual customers.

Summary of the Invention

In embodiments of the present invention, telecommunications terminal blocks are provided for making and breaking connections between a first

telecommunications conductor, a second telecommunications conductor and a service wire. The terminal block includes a housing having a first connector connected to the first telecommunications conductor and a second connector connected to the second telecommunications conductor mounted therein. A first 5 conductor is provided in the housing, the first conductor being electrically connected to the first connector and having a service wire connector portion configured to receive the service wire. A switch electrically connects the first connector and the second connector, the switch having a first state wherein the first connector is electrically connected to the second connector and a second state 10 wherein the first connector is electrically disconnected from the second connector.

In other embodiments of the present invention, the switch includes a third connector mounted adjacent the second connector in the housing, the first connector being electrically connected to the third connector, and a select module positioned over the second connector and the third connector, the select module 15 having a first position electrically connecting the second connector and the third connector and a second position wherein the second connector and the third connector are not electrically connected. The select module may include a housing and a jumper conductor mounted in the housing of the select module, the jumper conductor having, when the select module is in the first position, a first end positioned to contact the second connector and a second end positioned to contact 20 the third connector.

In further embodiments, the first connector comprises a first end of a longitudinally extending member and the first conductor comprises an opposite end of the longitudinally extending member. The housing of the terminal block may 25 include a base having a first portion and a second portion, the longitudinally extending member being mounted in the first portion with the first conductor extending from an upper surface of the base, the second connector and the third connector being mounted in the second portion of the base. A movably mounted service wire connector member may be positioned adjacent the upper surface of the

base in the first portion, the service wire connector member including a service wire receiving passageway that receives a service wire for connection to the first conductor. The service wire connector member may have a first position that provides access to an opening to the service wire receiving passageway to receive a

5 service wire and a second position wherein a portion of the service wire receiving passageway passes through an opening in the first conductor. The housing of the select module may be mounted to the base adjacent the second portion. The first conductor may be an insulation displacing connector and the service wire connector member may be rotatably mounted to the base to insert a service wire in

10 the passageway into the insulation displacing connector. The housing of the select module may be mounted to the base in a first orientation in the first position of the select module and in a second orientation in the second position of the select module. The second orientation may be substantially a 180° rotation from the first orientation.

15 In other embodiments of the present invention, the first telecommunications conductor is a tip conductor from a telephone company central office and the second telecommunications conductor is a tip conductor extending from the terminal block downstream from the telephone company central office and the service wire is a tip service wire from a user premise. The terminal block further

20 includes a ring input connector mounted in the first portion of the base of the housing of the terminal block connected to a corresponding ring conductor from the telephone company central office paired with the tip conductor. A ring output connector is mounted in the second portion of the base of the housing of the terminal block connected to a corresponding ring conductor extending from the

25 terminal block downstream from the telephone company central office paired with the tip conductor extending from the terminal block downstream from the telephone company central office. A ring conductor electrically connected to the ring input connector extends from the upper surface of the base of the housing of the terminal block in the first portion. A ring jumper connector is mounted in the

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second portion of the base of the housing of the terminal block adjacent the ring output connector, the ring jump connector being electrically connected to the ring input connector. The select module includes a second jumper conductor mounted in the housing of the select module, the second jumper conductor having, when the 5 select module is in the first position, a first end positioned to contact the ring output connector and a second end positioned to contact the ring jumper connector. The service wire connector member further including a second service wire receiving passageway that receives a ring service wire for connection to the ring conductor, the service wire connector member having a first position that provides access to an opening to the second service wire receiving passageway to receive the ring service wire and a second position wherein a portion of the second service 10 wire receiving passageway passes through an opening in the ring conductor.

15 In yet other embodiments of the present invention, a ground connector is mounted in the second portion of the base of the housing of the terminal block. An electrical protection device is positioned in the housing of the select module so as to be electrically connected between the jumper conductor and the ground connector and between the second jumper conductor and the ground connector. In further embodiments, the base of the housing of the terminal block is elongate and includes a plurality of termination stations, the termination stations having
20 respective first portions and second portions, tip and ring input connectors, tip and ring output connectors, tip and ring service wire conductors, select modules and service wire connector members to provide a multi-station terminal block.

25 In further embodiments of the present invention, the housing of the terminal block includes a base having a first portion and a second portion, the first connector and the first conductor being mounted in the first portion with the service wire connector portion extending from an upper surface of the base, the second connector being mounted in the second portion of the base. A movably mounted service wire connector member is positioned adjacent the upper surface of the base in the first portion, the service wire connector member including a service

wire receiving passageway that receives a service wire for connection to the first conductor, the service wire connector member having a first position that provides access to an opening to the service wire receiving passageway to receive a service wire and a second position wherein a portion of the service wire receiving

5 passageway passes through an opening in the service wire connector portion of the first conductor. A contact member electrically connected to the second connector and extends from the base of the housing of the terminal block and contacts the first conductor. An actuator is positioned in the service wire connector member so as to allow the contact member to contact the first conductor in the first position of

10 the service wire connector member and to break the contact between the contact member and the first conductor in the second position of the service wire connector member. The contact member may be a first end of an elongate conductive member and the second connector may be a second end of the elongate conductive member. The actuator may be a cam.

15 In yet further embodiments of the present invention, terminal blocks for making and breaking connections with a telecommunications conductor are provided. The terminal blocks include a base having a first connector and a second connector mounted therein. A first conductor extends from the base, the first conductor being electrically connected to the first connector. A second conductor also extends from the base, the second conductor being electrically connected to the second connector. A service module is provided which is configured to be removably mounted to the base. The service module includes a service wire connector configured to receive a customer telecommunications conductor and a contact member that electrically connects the service wire connector to the first conductor when the service module is mounted to the base. The first conductor and the second conductor are configured so as to electrically connect the first connector and the second connector when the service module is removed from the base. The service module is configured to interrupt the electrical connection of the

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first connector and the second connector when the service module is mounted to the base.

In further embodiments of the present invention, the contact member is configured to disconnect the electrical connection of the first connector and the second connector when the service module is mounted to the base. The service wire connector may be a first end of a longitudinally extending conductive member positioned to receive the customer telecommunications conductor and the contact member may be a second end of the longitudinally extending conductive member. The second end of the longitudinally extending conductive member may contact the first conductor when the service module is mounted to the base. The service module may include a conductor chamber and the service wire connector may be positioned in the conductor chamber. A passageway may extend into the conductor chamber having an opening for receiving the customer telecommunications conductor and be positioned to pass the customer telecommunications conductor to the service connector.

In other embodiments of the present invention, the first conductor is positioned adjacent to the second conductor so as to contact the second conductor when the service module is removed from the base. The service module may further include a nonconductive member positioned to pass between the first conductor and the second conductor when the service module is mounted to the base. The first conductor and the second conductor may comprise a spring clip. In various embodiments, the nonconductive member extends from a bottom surface of the service module adjacent the base. The contact member may include an electrically conductive layer on a surface of the nonconductive member adjacent the first conductor when the service module is mounted to the base and a connector that electrically connects the electrically conductive layer to the service wire connector. In other embodiments, the nonconductive member includes a channel in a surface thereof adjacent the first conductor when the service module is

mounted to the base and the contact member is received in the channel of the nonconductive member.

In further embodiments of the present invention, the first connector is a first end of a second longitudinally extending conductive member and the first 5 conductor is a second end of the second longitudinally extending conductive member. The second connector is a first end of a third longitudinally extending conductive member and the second conductor is second end of the third longitudinally extending conductive member. The service wire connector may be an insulation displacing connector.

10 In other embodiments of the present invention, the service module includes a base portion defining a conductor chamber. A cover may be rotatably connected to a first end of the base portion on a top portion thereof displaced from the base of the terminal block. A passageway in the cover may extend into the conductor chamber, the passageway having an opening on a second end of the cover opposite 15 the first end for receiving the customer telecommunications conductor. The passageway may be positioned to pass the customer telecommunications conductor to the insulation displacing connector. Rotation of the cover to a closed position may connect the customer telecommunications conductor to the insulation displacing connector.

20 In further embodiments of the present invention, the terminal block further includes a third connector and a fourth connector mounted in the base. A third conductor may extend from the base, the third conductor being electrically connected to the third connector, and a fourth conductor may extend from the base, the fourth conductor being electrically connected to the fourth connector. The 25 fourth conductor and the third conductor may comprise a second spring clip. In other embodiments the service module further includes a second service wire connector configured to receive a second customer telecommunications conductor and a second contact member that electrically connects the second service wire connector to the third conductor when the service module is mounted to the base.

The second spring clip may electrically connect the third connector and the fourth connector when the service module is removed from the base and the second contact member may be configured to electrically disconnect the first connector and the second connector when the service module is mounted in the base.

5 In other embodiments of the present invention, the nonconductive member includes a second channel in a surface thereof adjacent the third conductor when the service module is mounted to the base and wherein the second contact member is received in the second channel of the nonconductive member. The second channel and the first channel may be in opposite surfaces of the nonconductive member. The first and second customer telecommunications conductors may be tip and ring lines. A line protector may be electrically connected between the first conductor and the third conductor in the service module when the service module is mounted to the elongate base.

10 In further embodiments of the present invention, the second service wire connector is a first end of a fourth longitudinally extending conductive member positioned to receive the second customer telecommunications conductor and the second contact member is a second end of the fourth longitudinally extending conductive member, the second end of the fourth longitudinally extending conductive member contacting the third conductor when the service module is mounted to the base. The first longitudinally extending conductive member may include a circuit connector and the fourth longitudinally extending conductive member may include a second circuit connector, the circuit connector and the second circuit connector being positioned to receive an electrical device therebetween.

15 In other embodiments of the present invention, the base is elongate and defines a first axis and the first spring clip is positioned adjacent and laterally offset from the second spring clip with reference to the first axis. A plurality of service modules may be removeably mounted to the elongate base along the first axis. The base may include an elongate chamber and the first spring clip and the

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second spring clip may be positioned in the elongate chamber. An environmental sealant, such as a gel, may be included in the elongate chamber and in the conductor chamber. The plurality of service modules may include clip members and the elongate base may then include a plurality of clip receptacles spaced along 5 the first axis and configured to receive the clip members to mount the service modules to the elongate base.

In further embodiments of the present invention, the service module includes a conductor chamber and an environmental sealant in the conductor chamber. The service wire connector and the second service wire connector may 10 be positioned in the conductor chamber. The service module may include a circuit contact member that electrically connects to the second conductor when the service module is mounted to the base. The circuit contact member may be configured to electrically connect an electrical device between the first connector and the second connector.

15 In other embodiments of the present invention, a telecommunications terminal block for making and breaking connections with a telecommunications conductor is provided. The terminal block includes a base having a first connector and a second connector mounted therein. A first conductor extends from the base, the first conductor being electrically connected to the first connector. A second conductor extends from the base, the second conductor being electrically connected to the second connector. A service module is configured to be movably mounted 20 to the base for movement between a first position adjacent the base and a second position displaced vertically from the base. The service module includes a service wire connector configured to receive a customer telecommunications conductor and a contact member that electrically connects the service wire connector to the first connector when the service module is in the first position. The first connector and the second connector are configured so as to electrically connect the first conductor and the second conductor when the service module is in the second position. The service module is configured to interrupt the electrical connection of 25

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the first conductor and the second conductor when the service module is in the first position.

In further embodiments of the present invention, methods are provided for making and breaking connections with a telecommunications conductor. X pairs of telecommunications conductor wires from a telecommunications conductor cable extending from a central office facility are severed. The telecommunications conductor cable has more than X pairs of telecommunications conductor wires. A first end of the severed X pairs of telecommunications conductor wires is connected to a first group of X pairs of wires and a second end of the severed X pairs of telecommunications conductor wires is connected to a second group of X pairs of wires. The first and second group of X pairs of wires are extended to a telecommunications customer service wire junction box. Ones of the first group of X pairs of wires are selectively connected to at least one of a pair of customer service wires or one of the second group of X pairs of wires in the customer service wire junction box.

In other embodiments of the methods of the present invention, the customer service wire junction box is a telephone company pedestal and the X pairs of telecommunications conductor wires are severed at a splice, such as a buried splice closure. The number, X, of pairs of wires may be 25. In various embodiments selectively connecting includes leaving corresponding ones of the second group of X pairs of wires disconnected from ones of first group of X pairs of wires which are connected to a pair of customer service wires. Corresponding ones of the second group of X pairs of wires may be connected to ones of first group of X pairs of wires which are not connected to a pair of customer service wires.

In further embodiments of the present invention, telecommunications terminal blocks are provided for making and breaking connections with a telecommunications conductor. The terminal blocks include a base having a first connector and a second connector mounted therein. A first conductor extends from the base, the first conductor being electrically connected to the first connector. A

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second conductor also extends from the base, the second conductor being electrically connected to the second connector. The terminal blocks further include means for electrically connecting a service wire connector to the first conductor and for interrupting the electrical connection of the first connector and the second 5 connector when the first conductor is connected to the service wire connector and means for electrically connecting the first connector and the second connector when the first conductor is not connected to the service wire connector.

In other embodiments of the present invention, telecommunications 10 terminal blocks are provided for making and breaking connections with a severed telecommunications conductor. The terminal blocks include means for connecting to a first end and a second end of the severed telecommunications conductor. The terminal blocks further include means for connecting the first end to a customer service wire and disconnecting the first end from the second end when the first end is connected to the customer service wire and for connecting the first end and the 15 second end when the first end is not connected to the customer service wire.

In yet other embodiments of the present invention telecommunications 20 terminal blocks are provided for making and breaking connections between a telecommunications conductor and a service wire. The terminal block includes a housing having a first connector and a second connector mounted therein, the first connector being electrically connected to the telecommunications conductor. A first conductor is provided in the housing, the first conductor being electrically connected to the second connector and having a service wire connector portion configured to receive the service wire. An electrical protection device electrically connects the first connector and the second connector. The electrical protection 25 device may be a fuse circuit. The housing may include a base having a first portion and a second portion, the first conductor being mounted in the first portion with the service wire connector portion extending from an upper surface of the base, the first connector and the second connector being mounted in the second portion of the base, the second connector being mounted adjacent the first connector. A

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movably mounted service wire connector member may be positioned adjacent the upper surface of the base in the first portion, the service wire connector member including a service wire receiving passageway that receives a service wire for connection to the service wire connector portion, the service wire connector
5 member having a first position that provides access to an opening to the service wire receiving passageway to receive a service wire and a second position wherein a portion of the service wire receiving passageway passes through an opening in the service wire connector portion. A protection module may be mounted to the base adjacent the second portion, the electrical protection device being positioned
10 in the protection module.

Brief Description of the Drawings

FIG. 1 is a schematic view of a terminal block in a telephone company pedestal connected to customer service wires and to a telecommunications conductor cable from a central office according to the prior art;
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FIG. 2 is a schematic view of a terminal block according to embodiments of the present invention in a telephone company pedestal connected to customer service wires and to a telecommunications conductor cable from a central office;

FIGs. 3A and 3B are perspective views of telecommunications terminal blocks according to embodiments of the present invention;
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FIG. 4 is an exploded perspective view of a telecommunications terminal block according to embodiments of the present invention illustrating components of the base;

FIGs. 5A and 5B are perspective views of a service module according to embodiments of the present invention having covers in an open position to receive customer service wires and a closed position to terminate customer wires respectively;
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FIG. 6 is an exploded perspective view of a service module according to the present invention including a line protector device;

FIG. 7 is an exploded perspective view of the service module of **FIG. 6** with a wall of the base portion removed;

5 **FIGs. 8A and 8B** are cut-away perspective views of a telecommunications terminal block according to embodiments of the present invention with the service module mounted to the base and removed from the base respectively;

FIGs. 9A and 9B are cut-away perspective views of a telecommunications terminal block according to further embodiments of the present invention with the service module in a first position adjacent the base and a second position displaced from the base respectively;

10 **FIGs. 10A and 10B** are cut-away perspective views of a telecommunications terminal block according to further embodiments of the present invention with a select module in a first position through connecting telecommunications conductor wires and a second position disconnecting the telecommunications conductor wires;

15 **FIGs. 11A and 11B** are cut-away perspective views of the telecommunications terminal block of **FIGs. 10A and 10B** including an electrical protection device with the select module in a first position through connecting telecommunications conductor wires and a second position disconnecting the telecommunications conductor wires;

20 **FIG. 12** is a cut-away perspective view of a telecommunications terminal block according to further embodiments of the present invention;

FIG. 13 is a cut-away perspective view of a telecommunications terminal block according to yet further embodiments of the present invention including an in-line electrical protection device;

25 **FIG. 14** is an exploded perspective view of a 25 station telecommunications terminal block according to embodiments of the present invention;

FIG. 15 is an exploded perspective view of a 50 station telecommunications terminal block according to embodiments of the present invention;

5 **FIGs. 16A and 16B** are cut-away perspective views of a telecommunications terminal block according to further embodiments of the present invention with a select module in a first position through connecting telecommunications conductor wires and a second position disconnecting the telecommunications conductor wires;

10 **FIGs. 17A and 17B** are cut-away perspective views of a telecommunications terminal block according to further embodiments of the present invention with a service wire connector member in a first position through connecting telecommunications conductor wires and a second position disconnecting the telecommunications conductor wires; and

15 **FIG. 18** is a flowchart illustrating operations for making and breaking connections with a telecommunications conductor according to embodiments of the present invention.

Detailed Description of the Invention

20 The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the 25 art. Like numbers refer to like elements throughout. In the drawings, layers, objects and regions may be exaggerated for clarity.

26 The present invention will now be described with reference to the embodiments illustrated in the figures. Referring first to **FIG. 2**, a schematic view of a terminal block according to embodiments of the present invention in a

telephone company pedestal connected to customer service wires and to a telecommunications conductor cable from a central office will now be described. The telecommunications conductor cable **50**, typically a copper wire cable, extends from the Telco central office **52** to a neighborhood or neighborhoods where

5 customer service is desired. At a splice **54**, a plurality of pairs of telecommunications wires are accessed to bring connections to the pedestal **62**. The splice **54** may be an underground splice or an above ground splice. Similarly, the pedestal **62** may be provided as a surface mounted pedestal, an overhead suspended pedestal or a buried pedestal. However, pedestals **62** are generally

10 located at ground level at various locations throughout the neighborhood or neighborhood serviced by the telecommunications conductor cable **50**.

The connections at the splice **54** to individual wires in the telecommunications conductor cable **50** are schematically illustrated with reference to a single pair of wires **56**, **58**. As shown in the embodiments of **FIG. 2**, wires **56**, **58**, **58** are severed and their corresponding counterpart wires **56'**, **58'** continue to extend downstream from the splice **54** in the telecommunications conductor cable **50** to be available to other pedestal. It is to be understood, however, that a plurality of wire pairs, typically 25 pairs, will be accessed at the splice **54** and routed to the pedestal **62** to provide service access to a plurality of customers **68**. As is further illustrated in **FIG. 2**, each of the wires **56**, **58**, **56'**, **58'** is routed to the pedestal **62** by cable **60**. For example, where 25 wire pairs are accessed at the splice **54**, cable **60** may be a 50 pair cable. Alternatively, various other cable configurations, such as two 25 pair cables, may be provided for cable **60**. In any event, in accordance with the present invention, both ends of at least one telecommunications wire,

20 including the end extending to the Telco central office **52**, shown as **56**, **58** in **FIG. 2**, and the end extending downstream, shown in **FIG. 2** as wire **56'**, **58'**, is extended to the pedestal **62**. As illustrated in **FIG. 2**, each telecommunications wire accessed at the splice **54** has both ends of the accessed telecommunications wire routed to the pedestal **62**. However, in keeping with the present invention, it

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is to be understood that one or more of the telecommunication wires accessed at the splice **54** may be routed to the pedestal **62** using a bridge connection as was described previously with reference to **FIG. 1**.

At the pedestal **62**, one or more terminal blocks **64** in accordance with 5 embodiments of the present invention are provided. While a single terminal block **64** is shown in **FIG. 2** for illustrative purposes, it is to be understood that a plurality of such terminal blocks **64** may be provided in a terminal block assembly. A plurality of service modules may be associated with one or more base units mounted in the pedestal **62** to provide the plurality of terminal blocks **64**. For 10 example, where 25 pairs of telecommunication wires are accessed at the splice **54**, a single base supporting up to 25 service modules may be provided as will be described further herein.

As shown in the embodiments of **FIG. 2**, the terminal block **64** may provide a connection from the central office **52** between the telecommunications 15 wire pair **56, 58** and the customer service wire **66** to provide a connection to the customer **68**. In addition, the first end of the telecommunication wires **56, 58** extending from the Telco central office **52** may be connected to the corresponding telecommunications wires **56', 58'**, thereby maintaining an electrical connection from the Telco central office **52** through to downstream locations on the 20 telecommunications conductor cable **50** more remote from the Telco central office **52** than the splice **54**. The wires **56, 58** may be directly connected to the wires **56', 58'** as illustrated by the dotted lines within the terminal block **64** in **FIG. 2**. Alternatively, circuitry can be placed between the wires **56, 58, 56', 58'**.

Referring now to **FIG. 3A**, embodiments of a telecommunications terminal 25 block according to the present invention will now be further described. The telecommunications terminal block assembly **100**, as shown in the embodiments of **FIG. 3A** provides 25 telecommunications terminal blocks for making and breaking connections with a telecommunications conductor. As shown in **FIG. 3A**, two stations of the telecommunications terminal block assembly **100** are configured as

operative terminal blocks with the inclusion of service modules 110. As shown in FIG. 3A, the service modules 110 are configured to be removably mounted to a base 107 configured to support up to 25 service modules 110. Each terminal station within the base 107 may include a first and a second pair of connectors to support tip and ring line connections. The connectors may be mounted in the base 107 so as to allow each station of the base 107 to be wired to an incoming and an outgoing connection for wires in cable 105. For example, a first connector in a base 107 at a first station may be connected to a wire 56 and a second associated connector mounted in the base 107 at the first station may be wired to a corresponding telecommunications wire 56'. The connections of the connectors mounted in the base 107 to wires from the cable 105 may be provided by the manufacturer of the telecommunications terminal block assembly 100 which may then be sold with a pigtail type cable 105. The connections may be a variety of means such as wire wrap, insulation displacing connectors or post type connectors.

The base 107 may include a bottom (or base) portion 115 and a top portion 125. The service modules 110 are shown mounted adjacent the top portion 125. An end wall 120 of the base portion 115 may include a connector 150 for securing the cable 105 to the base 107. Each of the service module receiving terminal stations of the base 107, as shown for the embodiments of FIG. 3A, includes a front latch opening 140 and a back latch opening 135 as well as a latch lever 145. The latch openings 135 and 140 are configured to receive associated latches of service modules 110 for mounting the service modules 110 to the base 107. An opening 130 is further provided in the top surface 125 for the terminal stations to allow the service modules 110 access to the connectors within the base 107.

Further embodiments of telecommunications terminal blocks according to the present invention are illustrated in FIG. 3B. The telecommunications terminal block assembly 200 is illustrated with 25 terminal stations, each configured to support one of the service modules 210. The openings 230, 240 and the latch 245 operate substantially as described previously with reference to the openings 130,

140 and latch 145 with reference to **FIG. 3A** and will not be described further herein. The base 207, as shown in **FIG. 3B**, includes a bottom (or base) portion 215 and a top cover 225. The openings 242 in the top cover 225 may provide access for components in the service modules 210 to connections, such as a ground strip, in the base 215 and/or to facilitate alignment of the service modules 210. The end wall 220 of the base 207, as shown in **FIG. 3B**, includes a connector assembly 250 for connecting to the cable 205.

As will be apparent to those of skill in the art from **FIGS. 3A** and **3B** and subsequent figures to be described herein, the terminal block assembly 200 of **FIG. 10 3B** differs from the terminal block assembly 100 of **FIG. 3A** in, among other things, the latching mechanism and the design of the service modules 110, 210. Similarly, the top cover 225 illustrated in **FIG. 3B** mounts over the base 207 and the connector assembly 250 includes a chamber which may be suitable for providing mechanical support and/or environmental sealing for the conductor cable 205.

15 The base 207 will now be further described with reference to the illustration of **FIG. 4**. As shown in the illustrated embodiments in **FIG. 4**, a longitudinally extending member 300 and a longitudinally extending member 302 are mounted in the bottom portion 215 of the base 207. The longitudinally extending conductive member 302 includes a connector 310 on a first end thereof and a conductor 312 on a second end thereof. The longitudinally extending conductive member 300 similarly includes a conductor, a portion of which is visible in **FIG. 4**, on a first end thereof and a connector on a second end thereof (not shown). The conductor 312 and the conductor of member 300 extend from the base 207 with the conductor 312 being electrically connected to the conductor end of connector 300. As shown in **FIG. 4**, the conductor 312 and the connector 310 each extend longitudinally in opposite directions and at right angles to a connecting plate portion 313. The longitudinally extending conductive member 300 may be similarly configured.

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The conductor end of the longitudinally extending member 300 and the conductor 312 are configured so as to electrically connect the connector 310 and the connector (not shown) of the longitudinally extending conductive member 300 when the service module 210 is removed from the base 207. The conductor 312

5 and the corresponding conductor of the longitudinally extending conductive member 300 thus comprise a spring clip as shown for the embodiments of **FIG. 4**. In other words, the first conductor 312 and the associated conductor portion of member 300 are positioned in adjacent relationship so as to make contact when the service module 210 is removed from the base 207.

10 Each terminal station (two of which are shown in **FIG. 4**) for the embodiments of **FIG. 4** includes connections for two wires, for example, of a tip and ring wire (or line). Thus, the described members 300 and 302 may be associated with a first (tip or ring) line and additional longitudinally extending conductive members 304, 306 may be associated with a second (ring or tip) line of 15 the pair of wires associated with a terminal station of the base 207 and an individual service module 210 mounted in the terminal station. As seen in **FIG. 4**, the member 304 may include a connector 314 at a first longitudinally extending end thereof and a conductor 316 at an opposite end. Thus, members 304, 306 may be configured as described previously with reference to members 300, 302.

20 The conductors 312, 316 (and the conductor ends of members 300, 306) are shown positioned in an elongate chamber 320 of the base 207. The elongate chamber 320 is defined by the sidewalls 338, 340 and the bottom wall 318. The members 300, 302, 304, 306 as shown in **FIG. 4** are mounted in the bottom wall 318 with the connectors 310, 314 positioned in longitudinally extending slots 322 25 and 324, respectively.

As shown in **FIGs. 3A, 3B and 4**, the base 207 extends along a first axis L (see **FIG. 4**). The spring clip defined by the conductors of members 300 and 302 is positioned adjacent and laterally offset from the spring clip defined by two conductors of members 304 and 306 with reference to the axis L. The terminal

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stations for the respective service modules **210** are positioned along the axis **L**. However, it is to be understood that the respective spring clips need not be laterally offset and can be placed along the axis **L** and further may be laterally aligned, as contrasted with the longitudinal offset between the first and second spring clips as 5 shown in the illustrated embodiments of **FIG. 4**. However, the illustrated offset relationship may facilitate the packaging size requirements of the telecommunications terminal block assembly **200**.

The top cover **225**, as illustrated in **FIG. 4**, includes a downwardly extending skirt portion **332** configured to wrap around the bottom portion **215**. A 10 channel **336** is positioned to receive the sidewall **338** of the bottom portion **215** and a channel **334** is configured to receive the sidewall **340** of the base portion **215**. the openings **328** in the bottom portion **215** are configured to receive the clip **350** of the service module **210** when it passes through the corresponding opening **240** in the top cover **225** and to receive the member **352** passing through the opening **242** 15 in the cover **225**. An elongate channel **330** may be configured to receive the member **352**. The member **352** may be a conductive member and the channel **330** may be positioned to guide the conductive member **352** into contact with a ground bus positioned in the base **207**. The member **352** may further facilitate alignment between the service module **210** and the base **207**.

20 The service module **210** in the illustration of **FIG. 4** further includes a nonconductive member **354** extending from a bottom face of the service module **210** and a contact member **356** positioned in a channel on a surface of the nonconductive member **354**. The nonconductive member **354** and the contact member **356** pass through the opening **230** when the service module **210** is 25 mounted to the base **207**. The contact member **356** may thus be placed in contact with the conductor **316** of the member **304** while, at the same time, a portion of the nonconductive member **354** is positioned between the members **304** and **306** to interrupt the electrical connection therebetween when the service module **210** is mounted to the base **207**.

Referring now to the embodiments illustrated in **FIG. 5A** and **FIG. 5B** of a service module according to the present invention, the service module 110 is shown in an open position in **FIG. 5A** and a closed position in **FIG. 5B**. The service module 110, as illustrated in the embodiments of **FIG. 5A** and **FIG. 5B**,

5 includes a base portion 400 which defines a conductor chamber and a cover 402 which is rotatably connected to the base portion 400 as shown in **FIGS. 5A** and **5B**, the cover 402 is rotatably connected to an end 404 of the base portion 400 by a hinge 406. As can be seen in **FIG. 5A**, when the cover is rotated to the open position, openings 408, 410 are provided to allow customer service wires 409 to be

10 passed into passageways in the cover 402. The cover 402 may be latched in a closed position by the latch 412.

Referring now to the illustrations of **FIGS. 6, 7, 8A** and **8B** generally, further embodiments of a service module 110, 210 according to the present invention will be further described. As shown for the illustrated embodiments in

15 **FIGS. 6 and 7**, the service module 210 includes a base portion 500 defining a conductor chamber 501 and a cover 502 rotatably connected to an end 504 of the base portion 500 on a top portion 505 thereof. As shown in the figures, the cover 502 rotatably connects to the hinge 506 with a bracket 508.

Longitudinally extending conductive members 520 and 540 are also

20 illustrated. As shown, longitudinally extending conductive member 520 includes a service wire connector 522 at a first end thereof positioned to receive customer telecommunication conductors, such as the customer service wires 409, and a contact member 524 at a second end thereof. A connecting portion 526 connects the service wire connector 522 and the contact member 524 that respectively

25 extend longitudinally in opposite directions and at right angles thereto. In addition, a circuit connector 528 extends from the connector portion 526. Similarly, the member 540 includes a service wire connector 542, a contact member 544 and a circuit connector 548. An electrical device 550, such as a line protector (for example, a gas tube or a varistor) may be positioned electrically connecting

between the circuit connectors 528 and 548 to place an electrical device across the respective pair of tip and ring lines. The service wire connectors 522, 542 may be insulation displacing connectors as illustrated in **FIG. 6**.

The contact members 524, 544 may respectively make electrical connection 5 with the member 300 and the member 304 (*see FIG. 4*) when the service module 210 is mounted to the base 207. The contact members 524, 544 may, thus, respectively electrically connect customer service wires placed in the service module 210 to the members 300, 304 respectively. For the illustrated 10 embodiments, as best seen in **FIG. 7**, the contact member 524 is positioned in a slot 359 of the nonconductive member 354 while the contact member 544 is positioned in a slot 358 on an opposite surface of the nonconductive member 354. This configuration may provide for disconnection of the electrical connection 15 between members 300 and 302 and members 304 and 306 respectively when the service module 310 is mounted to the base 207. Alternatively, electrical contact areas could be placed on opposing sides of the nonconductive member 354 to 20 allow electrical connections to each of the members 300, 302, 304 and 306 to allow electronic circuitry to be placed in circuit to interrupt the electrical connection of the incoming and outgoing telecommunications conductor wires, such as wires 56 and 56' or wires 58 and 58'. Similarly, while shown as a conductive member in a channel of a nonconductive member, the contact members 524 and 544 may be 25 provided as conductive coatings on a surface of the nonconductive member 354 and a connector, such as a spring loaded conductive member, may be provided to electrically connect the electrically conductive layers on the nonconductive member 354 to the service wire connectors 522, 542.

The service connectors 522, 542 are positioned in the chamber 501 and an environmental sealant, such as a gel, may be placed therein to facilitate environmental protection for the connections between the customer service wires and the service wire connectors 522, 542. An environmental sealant may also be placed in the elongate chamber 320 of the base 207 to facilitate environmental

protection of connections between the members **300, 302, 304, 306** and the contact members **524, 544**. An environmental sealant may also be placed in the chamber **326** of the base **207** to facilitate environmental protection of the connection between wires of the cable **205** and the respective connectors, such as connectors **322, 324**. The environmental sealant may be a gel such as those disclosed in United States Patent Nos. 4,634,207 and 4,864,725 which are incorporated herein by reference as if set forth in their entirety. As the connections to the conductor cable **205** generally need not be made and broken on a repeating basis, the environmental sealant in the chamber **326** need not be re-entrant. For example, a potting compound may be used.

The top cover **502**, as shown in **FIG. 7**, includes passageways **560, 562** extending into the conducting chamber **501**. The passageways have respective openings **564, 566** therein for receiving customer telecommunications conductor wires. The passageways **560, 562** are positioned in the cover **502** to pass the customer telecommunications conductor wires to the service wire connectors **522, 542**. As shown in **FIG. 7**, slots **570, 572** define a portion of the conductor chamber **501** and are positioned relative to the service wire connectors **522, 542** so as to receive the service wire connectors **522, 542** therein when the cover **502** is rotated into a closed position on the base **500**. Thus, customer service wires may be extended into the passageways **560, 562** and positioned in the slots **570, 572** so as to be driven into the insulation displacing connectors of the service wire connectors **522, 542** when the cover **502** is rotated into a closed position. As shown in **FIG. 7**, the passageways **560, 562** include stub ends **574, 576** at an end thereof to facilitate retaining the customer service wires in the passageway **560, 562** during establishment of electrical connections.

Referring now to the exploded perspective cut away views of **FIGs. 8A** and **8B**, terminal blocks according to various embodiments of the present invention including a service module **110** configured to be removably mounted to the base **107** for making and breaking connections with a telecommunications conductor

will now be further described. Service wires **808** and **810** are received in the service module **110**. For purposes of the description herein, service wire **808** will be referred to as the ring line and service wire **810** will be referred to as the tip line. However, it is to be understood that the tip and ring lines may be interchanged and/or other telecommunications wires may be utilized. In a typical customer environment, the customer telecommunications conductor (or service) wires **808**, **810** extend from the terminal block to the customer location, such as a telephone RJ11 jack or a network interface device (NID) typically mounted on the wall of a customer premise. A first, or tip, telecommunications conductor **806** and a first, or ring, telecommunications conductor **802** are received in the base **107**, such as from an underground or above ground splice in a telecommunications conductor cable having multi-pair wires.

Tip and ring in lines **806**, **802** are received in respective connectors **314'**, **311'**. Connector **314'** is on a first end of longitudinally extending conductive member **304'** which, in turn, is placed in electrical contact with conductor **540'** when the service module **110** is latched into the base **107** as described previously. Tip output line **804** and ring output line **800** are electrically connected to respective connectors (**310'** shown) and run from the base **107** to the respective splice location described previously with reference to the tip and ring in lines **806** and **802**. Accordingly, as can be seen best with reference to **FIG. 8B**, when the module **110** is removed from the base **107**, the respective tip in **806** and tip out **804** lines are electrically connected and the corresponding respective ring in **802** and ring out **800** lines are connected whereas, as illustrated in **FIG. 8A**, the in lines are connected to the customer service telecommunications wires **808**, **810** and the connection to the tip and ring out lines are broken.

Further embodiments of the present invention are illustrated in the cross-sectional diagrams of **FIGS. 9A** and **9B**. As with **FIGS. 8A** and **8B**, the terminal blocks illustrated in **FIGS. 9A** and **9B** are shown in an engaged and a disengaged position respectively. Like numbered components in **FIGS. 9A** and **9B** operate as

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described previously with reference to **FIGs. 6, 7, 8A** and **8B** and will not be described further herein. However, the embodiments illustrated in **FIGs. 9A** and **9B** are movably mounted to the base **307** between a first position, as shown in **FIG. 9A**, and a second position, as shown in **FIG. 9B**. The electrical connection characteristics of the respective wires for the first position substantially correspond to the mounted position as illustrated in **FIG. 8A** and the second position substantially correspond to the removed position illustrated in **FIG. 8B**.

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As shown in **FIGs. 9A** and **9B**, the service module **309** is mounted in a chamber of the base **307** and longitudinally movable between an up position, as 10 shown in **FIG. 9B**, and a down position, as shown in **FIG. 9A**, with the respective electrical connections to the tip and ring lines being substantially identical to those described previously with reference to **FIG. 8A** and **FIG. 8B**.

Further embodiments of the present invention will now be described with reference to **FIGs. 10A, 10B, 11A** and **11B**. **FIGs. 10A** and **10B** differ from 15 **FIGs. 11A** and **11B** in the inclusion of an electrical protection device **870** and a ground connection **872** in the illustrations of **FIGs. 11A** and **11B**. **FIGs. 10A** and **11A**, respectively, show a first position, in which the respective 20 telecommunications conductor in lines **802, 806** are electrically connected to corresponding telecommunications connector out lines **800, 804** while **FIGs. 10B** and **11B**, respectively, show a second position in which the tip and ring output and input lines are electrically disconnected. Note that, in all of **FIGs. 10A-11B**, the customer service wires **808, 810** are electrically connected in the terminal block.

As shown in the figures, the terminal block includes a housing including a base **812** and a movably mounted service wire connector member **814** as well as a 25 switch including a select module **816**. A plurality of stations including select modules **816** in a second portion of the base **812** and service wire connector members **814** in a first portion of the base **812**. Portions of three distinct termination stations are shown in **FIGs. 10A, 10B, 11A**, and **11B**.

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Tip in line **806** is received and electrically connected to connector **820** at a first end thereof and ring in line **802** is received and electrically connected to connector **818** at a first end thereof. The connector **820** is further electrically connected by a line **848** to an associated intermediate connector **826** and the connector **818** is connected by a line **850** to an associated intermediate connector **828**. The intermediate connector **826**, in turn, as illustrated in **FIG. 10A** connects through a jumper conductor **832** to the tip out connector **824** while the intermediate connector **828** is shown electrically connected by a jumper conductor **830** to the ring output connector **822**. The ring out line **800** is connected to the ring out connector **822** and the tip out line **804** is connected to the tip out connector **824**.

Each of the tip and ring in connectors **818, 820** provides a tip and ring conductor service wire connector portion on an opposite end thereof and electrically connected to the respective connector portions in the bottom of base **812** which receive tip in line **806** and ring in **802**. The respective service wire connector portions, shown as insulation displacing connectors in the figures, are positioned on ends of the connectors **818, 820** to receive the customer telecommunication service wires **808, 810**.

A switch assembly is provided by select modules **816** in combination with jumper conductors **830, 832** and intermediate connectors **826, 828**. The intermediate connectors **826, 828** respectively are positioned adjacent the tip and ring output connectors **824, 828** in a second portion of the base **812** with the select module **816** positioned over the respective conductors **824, 826, 822, 828**. The select module **816** has a first position electrically connecting the respective conductors **824, 826, 822, 828**, as shown in **FIG. 10A**, and a second position as shown in **FIG. 10B**, wherein the respective connectors are not electrically connected.

The jumper conductors **830, 832** are mounted in the housing of the select module **816**. As shown in the figures, the jumper conductors **830, 832** include long

and short respective ends for providing an electrical connection to both of the connector pairs 824, 826 and 822, 828 in the **FIG. 10A** position while not making this electrical connection in the second position, as shown in **FIG. 10B**.

As is further illustrated in **FIGS. 10A** and **10B**, the select modules 816 5 include handles 860 which include arrow designations wherein an arrow pointed out indicates a connection to the respective tip and ring out lines 804, 800 and an arrow designation facing in towards the service wire connector member 814 indicates the connection not being made to the output lines 800, 804.

The service wire connector member 814 is shown positioned in a second 10 portion of the base 812 adjacent the first portion including the select module 816. The base 812 includes a chamber 844 which may include an environmental sealant material, such as a gel, to provide environmental protection to the service wire connection portions of the connectors 818, 820 which are positioned above the bottom wall 856 of the housing 812. Note that the top face of the bottom wall 856 15 defines an upper surface of the base 812 with reference to the service wire connector member 814 and the select module 816. In addition, a chamber 842 is defined by the base 812 which may be potted or otherwise environmentally sealed to provide environmental protection to the connections to the respective tip and ring in and output lines 800, 802, 804, 806 as well as the intermediate connections 20 shown in **FIGs. 10A, 10B, 11A, and 11B**. An environmental sealant may further be provided in the chamber 846 defined by the housing of the select module 816 to provide environmental protection to the upper portion of the connectors 822, 824, 826, 828 and the jumper conductors 830, 832.

The service wire connector members 814, as shown in **FIGs. 10A, 10B, 25 11A, and 11B**, include a service wire passageway (834 shown) for each of the tip 810 and ring 808 service wires which passageway includes respective openings 836. In a rotated open position, the opening 836 is presented above the top 854 of the base 812 in a manner facilitating insertion of a service wire 808, 810 into the respective passageway through the corresponding opening. In the closed position

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illustrated as shown in **FIGs. 10A, 10B, 11A, and 11B**, a portion of the respective service wire receiving passageway 834, passes through the insulation displacing connector opening in the service wire connector portion of the connector 818 to establish an electrical connection therebetween when the service wire connector 5 member 814 is rotated from the open, wire receiving position to the illustrated closed position. The service wire connecting member 814 further includes an actuation handle 862 and a latch mechanism 852. The base 812 further may include a cover 854 which defines an upper surface of the chamber 844.

As is clear from **FIGs. 10A, 10B, 11A, and 11B**, the service wire connector 10 member 814 may be rotatably or otherwise removably mounted in the base 812 to provide for establishing a connection between the connectors 818, 820 and the service wires 808, 810. Furthermore, as shown by comparison between **FIG. 10A** and **10B**, the select module 816 may be provided with the first and second position being opposite orientations relative to the housing 812 such as the substantially 15 180° rotation between the two orientations shown in **FIGs. 10A and 10B**.

Referring now to **FIGs. 11A and 11B**, embodiments of the present invention including an electrical protection device 870 will be further described. A ground conductor 872 is provided in the portion of the base 812 adjacent the select module 816. The electrical protection device 870 is positioned in the chamber 20 defined by the housing of the select module 816. As illustrated in **FIG. 11A**, electrical protection generally referred to as three point protection may be provided by a gas tube 870 having a terminal connected to each of the respective tip and ring lines through the respective intermediate portions of the jumper conductors 830 and 832 as well as a centrally disposed ground connection point to the ground 25 conductor 872. The use of electrical protection devices such as gas tubes is generally known to those of skill in the art and will not be described further herein. Note that, as illustrated in **FIG. 11B**, the protection circuit is provided to the tip and ring input lines 802, 806 and the customer service wires 808, 810 but is not connected to the tip and ring output lines 804, 800. Note that **FIG. 12** illustrates

embodiments in which a protector is provided without tip and ring output lines being provided.

Referring now to **FIG. 13**, further embodiments of the present invention providing a terminal block for making and breaking connections between a telecommunications conductor and a service wire will be described. As shown in **FIG. 13**, the tip input line **806** is electrically connected to the connector **824** while the ring input line **802** is connected to the connector **822**. The connector **824** is, in turn, connected to the intermediate connector **826** through an electrical protection device **884** which is electrically connected between the respective connectors **824**, **826** by a jumper conductor **886**. Similarly, the electrical protection device **880** is electrically connected between the connectors **822** and **828** by a jumper conductor **882**. Accordingly, the respective electrical protection devices **884** and **880** are placed in series on the respective tip and ring input lines **802**, **806** which, in turn, connect through the electrical connection lines **848** and **850** to respective connectors **818**, **820** and, thus, to the customer telecommunications service wires **808**, **810**. As a result, when combined with a three point protection device, such as the gas tube described previously, five point protection may be provided for the tip and ring telecommunications circuit.

The electrical protection devices **880**, **884** may be fuse circuits, such as a fuse or a fusible link. Thus, under selected over-voltage or over-current conditions, in lieu of, or in addition to, a ground path through a device such as a gas tube, the connection of the incoming tip and ring lines to the customer service wires may be opened. Note that the common elements of the terminal block illustrated in **FIG. 13** otherwise operate substantially as described previously with respect to **FIGs. 10A, 10B, 11A, 11B** and **12** and will not be further described herein.

Referring now to **FIG. 14**, an exploded perspective view is provided showing a multi-station terminal block according to embodiments of the present invention including a plurality of termination stations along the elongate axis

defined by the base 812 to support a plurality of wire pairs from the telecommunications conductor cable 105. The respective service wire connector members 814 and select modules 816 operate generally as described previously with respect to various embodiments. As shown in **FIG. 14**, a total of 25

5 termination stations are provided, each supporting one tip and ring wire pair. A further embodiment is illustrated in **FIG. 15** wherein a 50 pair cable may be supported by 50 respective service wire connector members 814', pairs of which are supported by a respective one of 25 select module stations 816' positioned in the base 812'.

10 Yet further embodiments of the present invention will now be described with reference to **FIGS. 16A** and **16B**. The service wire connector member 914 is configured to receive the customer telecommunications service wires 808, 810 in substantially the manner described previously with reference to **FIGS. 10A** and 15 **10B** so as to provide an electrical connection to the service wire connector portions of the respective connectors 818 and 820 mounted in the base 912. The tip and ring in lines 806, 802 are connected at connection portions on a first end of the respective connectors 818, 820 in a lower chamber, defined by the housing 912, which may be environmentally sealed, such as by potting. A jumper connection 918 between one of the connectors 818 and an intermediate connection point 920 is 20 shown in the figures. A similar connection would be provided for the connector 820. The intermediate connector 920 has an associated ring line output connector 926 (see also tie line connector 931) which, in turn, is connected to the respective ring output line 804 (see also tie output line 800). The intermediate switch portion 922 provides a selectable electrical connection between the intermediate connector 25 920 through the conductive member 924 to connect through the connector 926 to the ring output line 804. The tip output line 800 is similarly connected through intermediate switch portion 928.

As shown in **FIG. 16A**, the select module 916 providing the switch for the illustrated terminal block includes a housing 932 and an actuator 934. The

transition between the input and output connected configuration shown in **FIG. 16A** and the open configuration shown in **FIG. 16B** may be provided, for example, by a slidable actuator configuration of actuator 934 or by a removable housing 932 which may be reinserted in a 180° rotated position in which the intermediate members 922, 928 are allowed to move, for example, due to a spring pre-load, to an open position breaking the electrical connections when an actuator lip 934 is moved to the opposite end and out of contact with the intermediate switch portions 922, 928.

Referring now to **FIG. 17A** and **17B**, further embodiments of terminal blocks according to the present invention will now be described. The terminal block includes a base 750 including tip and ring in connectors 820, 818 mounted in a first portion thereof and extending from an upper surface of the base 750. A respective tip and ring output connector 766, 768 is mounted in the second portion of the base 750. The movably mounted service wire connector member 776 is positioned adjacent the upper surface of the base 750 in the first portion. The service wire connector member 776, as shown in **FIG. 17A**, is pivotally mounted and includes a latch 778 as well as a service wire receiving passageway 779 having an opening 781 and a slot portion 780 crossing the passageway 779. The service wire receiving passageway 779 and opening 781 and slot 780 for receiving the connector 818 operate substantially as described previously with reference to **FIG. 10A**.

A contact member 770 extends from the output connector 768 in the second portion of the base 750 and extends from the base 750 to a second end 772 having a contact point 774 at an end thereof which is, as shown in **FIG. 17A**, positioned in contact with the service wire connector portion of the connector 818. An actuator 782 is positioned in the service wire connector member 776 so as to allow the contact member 770 to contact the connector 818 in the position illustrated in **FIG. 17A** and to break the contact between the contact member 770 and the connector 818 in the position of the service wire connector member 776 illustrated in **FIG.**

17B. As shown in FIGs. 17A and 17B, the actuator 782 is provided as a cam surface with a sloped portion engaging connector 818 to displace it from the contact point 774 of the contact member 770 as illustrated in FIG. 17B while allowing the connector 818, for example, through spring loading, to return into
5 engagement with the contact point 774 in the position shown in FIG. 17A. Accordingly, insertion of customer service wires into the passageway 779 and rotation of the service wire connector member 776 into the closed position both establishes a connection between the input lines 802, 806 and the customer service wires 808, 810 and breaks the connection between the respective input 802, 806 and output 800, 804 lines.

10 Operations for making and breaking connections with a telecommunications conductor according to embodiments of the present invention will now be described with reference to the flowchart illustration of FIG. 18. It is to be understood that, while the methods of the present invention may be
15 accomplished utilizing the terminal blocks of the present invention, other hardware may be utilized in keeping with the methods of the present invention.

Operations begin at block 1000 when X pairs of telecommunications conductor wires from a telecommunications conductor cable extending from a central office facility are severed, for example, at a splice. X pairs may be 25 pairs
20 for a typical application utilizing a telephone company pedestal. The telecommunications conductor cable has more than X pairs of telecommunications conductor wires. A first end of the severed X pairs of wires (block 1005). The second end of
25 the severed X pairs of telecommunications conductor wires is connected to a second group of X pairs of wires, such as those extending downstream away from the central office (block 1010). The first and second group of X pairs of wires are extended to a telecommunications customer service wire junction box, such as a telephone company pedestal (block 1015).

Ones of the first group of X pairs of wires are selectively connected to at least one of a pair of customer service wires or one of the second group of X pairs of wires in the customer service wire junction box as will be described for particular embodiments with reference to blocks **1020** and **1025**. As shown in

5 **FIG. 18** selective connecting operations may include connecting selected ones of the first group of X pairs of wires to a pair of customer service wires and leaving corresponding ones of the second group of X pairs of wires disconnected from ones of first group of X pairs of wires which are connected to a pair of customer service wires to interrupt the through connection (block **1020**). Corresponding ones of the 10 second group of X pairs of wires may be connected to ones of first group of X pairs of wires which are not connected to a pair of customer service wires (block **1025**).

The foregoing is illustrative of the present invention and is not to be construed as limiting thereof. Although a few exemplary embodiments of this invention have been described, those skilled in the art will readily appreciate that 15 many modifications are possible in the exemplary embodiments without materially departing from the novel teachings and advantages of this invention. Accordingly, all such modifications are intended to be included within the scope of this invention as defined in the claims. In the claims, means-plus-function clauses are intended to cover the structures described herein as performing the recited function 20 and not only structural equivalents but also equivalent structures. Therefore, it is to be understood that the foregoing is illustrative of the present invention and is not to be construed as limited to the specific embodiments disclosed, and that modifications to the disclosed embodiments, as well as other embodiments, are intended to be included within the scope of the appended claims. The invention is 25 defined by the following claims, with equivalents of the claims to be included therein.

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THAT WHICH IS CLAIMED:

1. A telecommunications terminal block for making and breaking connections with a telecommunications conductor, said terminal block comprising:
 - a base having a first connector and a second connector mounted therein;
 - a first conductor extending from the base, the first conductor being electrically connected to the first connector;
 - a second conductor extending from the base, the second conductor being electrically connected to the second connector; and
 - a service module configured to be removably mounted to the base, the service module comprising:
 - 10 a service wire connector configured to receive a customer telecommunications conductor; and
 - a contact member that electrically connects the service wire connector to the first conductor when the service module is mounted to the base;
 - 15 wherein the first conductor and the second conductor are configured so as to electrically connect the first connector and the second connector when the service module is removed from the base and wherein the service module is configured to interrupt the electrical connection of the first connector and the second connector when the service module is mounted to the base.
2. The terminal block of Claim 1 wherein the contact member is configured to disconnect the electrical connection of the first connector and the second connector when the service module is mounted to the base.
3. The terminal block of Claim 2 wherein the service wire connector comprises a first end of a longitudinally extending conductive member positioned

to receive the customer telecommunications conductor and wherein the contact member comprises a second end of the longitudinally extending conductive member, the second end of the longitudinally extending conductive member contacting the first conductor when the service module is mounted to the base.

4. The terminal block of Claim 3 wherein the service module further comprises a conductor chamber and the service wire connector is positioned in the conductor chamber.

5. The terminal block of Claim 4 wherein the service module further comprises a passageway extending into the conductor chamber having an opening for receiving the customer telecommunications conductor and positioned to pass the customer telecommunications conductor to the service connector.

6. The terminal block of Claim 3 wherein the first conductor is positioned adjacent to the second conductor so as to contact the second conductor when the service module is removed from the base.

7. The terminal block of Claim 6 wherein the service module further comprises a nonconductive member positioned to pass between the first conductor and the second conductor when the service module is mounted to the base and wherein the first conductor and the second conductor comprise a spring clip.

8. The terminal block of Claim 7 wherein the nonconductive member extends from a bottom surface of the service module adjacent the base.

9. The terminal block of Claim 7 wherein the contact member comprises:

an electrically conductive layer on a surface of the nonconductive member adjacent the first conductor when the service module is mounted to the base; and

5 a connector that electrically connects the electrically conductive layer to the service wire connector.

10. The terminal block of Claim 7 wherein the nonconductive member includes a channel in a surface thereof adjacent the first conductor when the service module is mounted to the base and wherein the contact member is received in the channel of the nonconductive member.

11. The terminal block of Claim 10 wherein the first connector comprises a first end of a second longitudinally extending conductive member and the first conductor comprises a second end of the second longitudinally extending conductive member and wherein the second connector comprises a first end of a

5 third longitudinally extending conductive member and the second conductor comprises a second end of the third longitudinally extending conductive member.

12. The terminal block of Claim 10 wherein the service wire connector is an insulation displacing connector.

13. The terminal block of Claim 12 wherein the service module further comprises:

a base portion defining a conductor chamber;

a cover movably connected to a first end of the base portion on a top

5 portion thereof displaced from the base of the terminal block; and

a passageway in the cover extending into the conductor chamber, the passageway having an opening on a second end of the cover opposite the first end for receiving the customer telecommunications conductor, the passageway being

positioned to pass the customer telecommunications conductor to the insulation
10 displacing connector; and

wherein rotation of the cover to a closed position connects the customer
telecommunications conductor to the insulation displacing connector.

14. The terminal block of Claim 10 wherein the terminal block further
comprises:

a third connector and a fourth connector mounted in the base;

a third conductor extending from the base, the third conductor being

5 electrically connected to the third connector;

a fourth conductor extending from the base, the fourth conductor being
electrically connected to the fourth connector, the fourth conductor and the third
conductor comprising a second spring clip; and

wherein the service module further comprises:

10 a second service wire connector configured to receive a second
customer telecommunications conductor; and

a second contact member that electrically connects the second
service wire connector to the third conductor when the service module is
mounted to the base;

15 wherein the second spring clip electrically connects the third connector and
the fourth connector when the service module is removed from the base and
wherein the second contact member is configured to electrically disconnect the first
connector and the second connector when the service module is mounted in the
base.

15. The terminal block of Claim 14 wherein the nonconductive member
includes a second channel in a surface thereof adjacent the third conductor when
the service module is mounted to the base and wherein the second contact member
is received in the second channel of the nonconductive member.

16. The terminal block of Claim 15 wherein the second channel and the first channel are in opposite surfaces of the nonconductive member.

17. The terminal block of Claim 15 wherein the first and second customer telecommunications conductors are tip and ring lines.

18. The terminal block of Claim 17 wherein the service module further comprises a line protector electrically connected between the first conductor and the third conductor when the service module is mounted to the elongate base.

19. The terminal block of Claim 14 wherein the second service wire connector comprises a first end of a fourth longitudinally extending conductive member positioned to receive the second customer telecommunications conductor and wherein the second contact member comprises a second end of the fourth

5 longitudinally extending conductive member, the second end of the fourth longitudinally extending conductive member contacting the third conductor when the service module is mounted to the base.

20. The terminal block of Claim 19 wherein the first longitudinally extending conductive member further comprises a circuit connector and the fourth longitudinally extending conductive member further comprises a second circuit connector, the circuit connector and the second circuit connector being positioned

5 to receive an electrical device therebetween.

21. The terminal block of Claim 13 wherein the base is elongate and defines a first axis and wherein the first spring clip is positioned adjacent and laterally offset from the second spring clip with reference to the first axis and wherein a plurality of service modules are removably mounted to the elongate base

5 along the first axis.

22. The terminal block of Claim 21 wherein the base includes an elongate chamber and wherein the first spring clip and the second spring clip are positioned in the elongate chamber.

23. The terminal block of Claim 22 further comprising an environmental sealant in the elongate chamber and in the conductor chamber.

24. The terminal block of Claim 21 wherein the plurality of service modules further comprise clip members and the elongate base further comprises a plurality of clip receptacles spaced along the first axis and configured to receive the clip members to mount the service modules to the elongate base.

25. The terminal block of Claim 21 wherein the service module further comprises:

a conductor chamber; and

an environmental sealant in the conductor chamber;

5 wherein the service wire connector and the second service wire connector are positioned in the conductor chamber.

26. The terminal block of Claim 1 wherein the service module further comprises a circuit contact member that electrically connects to the second conductor when the service module is mounted to the base, the circuit contact member being configured to electrically connect an electrical device between the first connector and the second connector.

27. A telecommunications terminal block for making and breaking connections with a telecommunications conductor, said terminal block comprising:
a base having a first connector and a second connector mounted therein;

5 a first conductor extending from to the base, the first conductor being
electrically connected to the first connector;

10 a second conductor extending from the base, the second conductor being
electrically connected to the second connector; and

15 a service module configured to be movably mounted to the base for
movement between a first position adjacent the base and a second position
displaced vertically from the base, the service module comprising:

20 a service wire connector configured to receive a customer
telecommunications conductor; and

25 a contact member that electrically connects the service wire
connector to the first connector when the service module is in the first
position;

30 wherein the first connector and the second connector are configured so as to
electrically connect the first conductor and the second conductor when the service
module is in the second position and wherein the service module is configured to
interrupt the electrical connection of the first conductor and the second conductor
when the service module is in the first position.

28. The terminal block of Claim 27 wherein the contact member is
configured to disconnect the electrical connection of the first conductor and the
second conductor when the service module is in the first position.

29. The terminal block of Claim 28 wherein the service wire connector
comprises a first end of a longitudinally extending conductive member positioned
to receive the customer telecommunications conductor and wherein the contact
member comprises a second end of the longitudinally extending conductive
5 member, the second end of the longitudinally extending conductive member
contacting the first conductor when the service module is in the first position.

30. The terminal block of Claim 29 wherein the service module further comprises a conductor chamber and the service wire connector is positioned in the conductor chamber.

31. The terminal block of Claim 30 wherein the service module further comprises a passageway extending into the conductor chamber having an opening for receiving the customer telecommunications conductor and positioned to pass the customer telecommunications conductor to the service connector.

32. The terminal block of Claim 29 wherein the first conductor is positioned adjacent to the second conductor so as to contact the second conductor when the service module is in the second position.

33. The terminal block of Claim 32 wherein the service module further comprises a nonconductive member positioned to pass between the first conductor and the second conductor when the service module is in the first position and wherein the first conductor and the second conductor comprise a spring clip.

34. The terminal block of Claim 33 wherein the nonconductive member extends from a bottom surface of the service module adjacent the base.

35. The terminal block of Claim 33 wherein the contact member comprises:

an electrically conductive layer on a surface of the nonconductive member adjacent the first conductor when the service module is in the first position; and

5 a connector that electrically connects the electrically conductive layer to the service wire connector.

36. The terminal block of Claim 33 wherein the nonconductive member includes a channel in a surface thereof adjacent the first conductor when the service module is in the first position and wherein the contact member is received in the channel of the nonconductive member.

37. The terminal block of Claim 36 wherein the first connector comprises a first end of a second longitudinally extending conductive member and the first conductor comprises a second end of the second longitudinally extending conductive member and wherein the second connector comprises a first end of a third longitudinally extending conductive member and the second conductor comprises a second end of the third longitudinally extending conductive member.

38. The terminal block of Claim 36 wherein the service wire connector is an insulation displacing connector.

39. The terminal block of Claim 38 wherein the service module further comprises:

- a base portion defining a conductor chamber;
- a cover rotatably connected to a first end of the base portion on a top portion thereof displaced from the base of the terminal block; and
- a passageway in the cover extending into the conductor chamber, the passageway having an opening on a second end of the cover opposite the first end for receiving the customer telecommunications conductor, the passageway being positioned to pass the customer telecommunications conductor to the insulation displacing connector; and
- wherein rotation of the cover to a closed position connects the customer telecommunications conductor to the insulation displacing connector.

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40. The terminal block of Claim 36 wherein the terminal block further comprises:

- a third connector and a fourth connector mounted in the base;
- a third conductor extending from the base, the third conductor being
- 5 electrically connected to the third connector;
- a fourth conductor extending from the base, the fourth conductor being electrically connected to the fourth connector, the fourth conductor and the third conductor comprising a second spring clip; and
- wherein the service module further comprises:
- 10 a second service wire connector configured to receive a second customer telecommunications conductor; and
- a second contact member that electrically connects the second service wire connector to the third conductor when the service module is in the first position; and
- 15 wherein the second spring clip electrically connects the third connector and the fourth connector when the service module is in the second position and wherein the service module is configured to electrically disconnect the first connector and the second connector when the service module is in the first position.

41. The terminal block of Claim 40 wherein the nonconductive member includes a second channel in a surface thereof adjacent the third conductor when the service module is in the first position and wherein the second contact member is received in the second channel of the nonconductive member.

42. The terminal block of Claim 41 wherein the second channel and the first channel are in opposite surfaces of the nonconductive member.

43. The terminal block of Claim 41 wherein the first and second customer telecommunications conductors are tip and ring lines.

44. The terminal block of Claim 43 wherein the service module further comprises a line protector electrically connected between the first conductor and the third conductor when the service module is in the first position.

45. The terminal block of Claim 40 wherein the second service wire connector comprises a first end of a fourth longitudinally extending conductive member positioned to receive the second customer telecommunications conductor and wherein the second contact member comprises a second end of the fourth longitudinally extending conductive member, the second end of the fourth longitudinally extending conductive member contacting the third conductor when the service module is in the first position.

5 46. The terminal block of Claim 45 wherein the first longitudinally extending conductive member further comprises a circuit connector and the fourth longitudinally extending conductive member further comprises a second circuit connector, the circuit connector and the second circuit connector being positioned to receive an electrical device therebetween.

5 47. The terminal block of Claim 40 wherein the base is elongate and defines a first axis and wherein the first spring clip is positioned adjacent and laterally offset from the second spring clip with reference to the first axis and wherein a plurality of service modules are moveably mounted to the elongate base along the first axis.

48. The terminal block of Claim 47 wherein the base includes an elongate chamber and wherein the first spring clip and the second spring clip are positioned in the elongate chamber.

49. The terminal block of Claim 47 wherein the service module further comprises a circuit contact member that electrically connects to the second conductor when the service module is in the first position, the circuit contact member being configured to electrically connect an electrical device between the first connector and the second connector.

50. A telecommunications terminal block for making and breaking connections between a first telecommunications conductor, a second telecommunications conductor and a service wire, said terminal block comprising:
a housing having a first connector connected to the first telecommunications conductor and a second connector connected to the second telecommunications conductor mounted therein;
a first conductor in the housing, the first conductor being electrically connected to the first connector and having a service wire connector portion configured to receive the service wire;
10 a switch electrically connecting the first connector and the second connector, the switch having a first state wherein the first connector is electrically connected to the second connector and a second state wherein the first connector is electrically disconnected from the second connector.

51. The terminal block of Claim 50 wherein the switch comprises:
a third connector mounted adjacent the second connector in the housing, the
first connector being electrically connected to the third connector; and
a select module positioned over the second connector and the third
5 connector, the select module having a first position electrically connecting the
second connector and the third connector and a second position wherein the second
connector and the third connector are not electrically connected.

52. The terminal block of Claim 51 wherein the select module further comprises:

- a housing; and
- a jumper conductor mounted in the housing of the select module, the
- 5 jumper conductor having, when the select module is in the first position, a first end positioned to contact the second connector and a second end positioned to contact the third connector.

53. The terminal block of Claim 52 wherein the first connector comprises a first end of a longitudinally extending member and the first conductor comprises an opposite end of the longitudinally extending member and wherein the housing of the terminal block comprises:

- 5 a base having a first portion and a second portion, the longitudinally extending member being mounted in the first portion with the first conductor extending from an upper surface of the base, the second connector and the third connector being mounted in the second portion of the base;
- a movably mounted service wire connector member positioned adjacent the
- 10 upper surface of the base in the first portion, the service wire connector member including a service wire receiving passageway that receives a service wire for connection to the first conductor, the service wire connector member having a first position that provides access to an opening to the service wire receiving passageway to receive a service wire and a second position wherein a portion of the
- 15 service wire receiving passageway passes through an opening in the first conductor; and

wherein the housing of the select module is mounted to the base adjacent the second portion.

54. The terminal block of Claim 53 wherein the first conductor is an insulation displacing connector and wherein the service wire connector member is

5 rotatably mounted to the base to insert a service wire in the passageway into the insulation displacing connector and wherein the housing of the select module is mounted to the base in a first orientation in the first position of the select module and in a second orientation in the second position of the select module.

55. The terminal block of Claim 54 wherein the second orientation comprises substantially a 180° rotation from the first orientation.

56. The terminal block of Claim 54 wherein the first telecommunications conductor is a tip conductor from a telephone company central office and wherein the second telecommunications conductor is a tip conductor extending from the terminal block downstream from the telephone company 5 central office and wherein the service wire is a tip service wire from a user premise, the terminal block further comprising:

 a ring input connector mounted in the first portion of the base of the housing of the terminal block connected to a corresponding ring conductor from the telephone company central office paired with the tip conductor;

10 a ring output connector mounted in the second portion of the base of the housing of the terminal block connected to a corresponding ring conductor extending from the terminal block downstream from the telephone company central office paired with the tip conductor extending from the terminal block downstream from the telephone company central office;

15 a ring conductor electrically connected to the ring input connector extending from the upper surface of the base of the housing of the terminal block in the first portion;

 a ring jumper connector mounted in the second portion of the base of the housing of the terminal block adjacent the ring output connector, the ring jump connector being electrically connected to the ring input connector;

wherein the select module further comprises a second jumper conductor mounted in the housing of the select module, the second jumper conductor having, when the select module is in the first position, a first end positioned to contact the ring output connector and a second end positioned to contact the ring jumper connector; and

wherein the service wire connector member further comprises a second service wire receiving passageway that receives a ring service wire for connection to the ring conductor, the service wire connector member having a first position that provides access to an opening to the second service wire receiving passageway 30 to receive the ring service wire and a second position wherein a portion of the second service wire receiving passageway passes through an opening in the ring conductor.

57. The terminal block of Claim 56 further comprising a ground connector mounted in the second portion of the base of the housing of the terminal block and further comprising an electrical protection device positioned in the housing of the select module so as to be electrically connected between the jumper conductor and the ground connector and between the second jumper conductor and the ground connector.

58. The terminal block of Claim 56 wherein the base of the housing of the terminal block is elongate and includes a plurality of termination stations, the termination stations having respective first portions and second portions, tip and ring input connectors, tip and ring output connectors, tip and ring service wire conductors, select modules and service wire connector members to provide a multi-station terminal block.

59. The terminal block of Claim 50 wherein the housing of the terminal block further comprises:

a base having a first portion and a second portion, the first connector and the first conductor being mounted in the first portion with the service wire

5 connector portion extending from an upper surface of the base, the second connector being mounted in the second portion of the base;

a movably mounted service wire connector member positioned adjacent the upper surface of the base in the first portion, the service wire connector member including a service wire receiving passageway that receives a service wire for

10 connection to the first conductor, the service wire connector member having a first position that provides access to an opening to the service wire receiving passageway to receive a service wire and a second position wherein a portion of the service wire receiving passageway passes through an opening in the service wire connector portion of the first conductor;

15 a contact member electrically connected to the second connector and extending from the base of the housing of the terminal block and contacting the first conductor; and

an actuator positioned in the service wire connector member so as to allow the contact member to contact the first conductor in the first position of the service

20 wire connector member and to break the contact between the contact member and the first conductor in the second position of the service wire connector member.

60. The terminal block of Claim 59 wherein the contact member comprises a first end of an elongate conductive member and wherein the second connector comprises a second end of the elongate conductive member and wherein the actuator comprises a cam.

61. A telecommunications terminal block for making and breaking connections between a telecommunications conductor and a service wire, said terminal block comprising:

a housing having a first connector and a second connector mounted therein,
5 the first connector being electrically connected to the telecommunications
conductor;
a first conductor in the housing, the first conductor being electrically
connected to the second connector and having a service wire connector portion
configured to receive the service wire;
10 an electrical protection device electrically connecting the first connector
and the second connector.

62. The terminal block of Claim 61 wherein the electrical protection
device is a fuse circuit.

63. The terminal block of Claim 62 wherein the housing further
comprises:

a base having a first portion and a second portion, the first conductor being
mounted in the first portion with the service wire connector portion extending from
5 an upper surface of the base, the first connector and the second connector being
mounted in the second portion of the base, the second connector being mounted
adjacent the first connector;
a movably mounted service wire connector member positioned adjacent the
upper surface of the base in the first portion, the service wire connector member
10 including a service wire receiving passageway that receives a service wire for
connection to the service wire connector portion, the service wire connector
member having a first position that provides access to an opening to the service
wire receiving passageway to receive a service wire and a second position wherein
a portion of the service wire receiving passageway passes through an opening in
15 the service wire connector portion; and
a protection module mounted to the base adjacent the second portion, the
electrical protection device being positioned in the protection module.

64. A method for making and breaking connections with a telecommunications conductor, said method comprising the steps of:
severing X pairs of telecommunications conductor wires from a telecommunications conductor cable extending from a central office facility, the
5 telecommunications conductor cable having more than X pairs of telecommunications conductor wires;
connecting a first end of the severed X pairs of telecommunications conductor wires to a first group of X pairs of wires and a second end of the severed X pairs of telecommunications conductor wires to a second group of X pairs of
10 wires;
extending the first and second group of X pairs of wires to a telecommunications customer service wire junction box; and
selectively connecting ones of the first group of X pairs of wires to at least one of a pair of customer service wires or one of the second group of X pairs of
15 wires in the customer service wire junction box.

65. The method of Claim 64 wherein the customer service wire junction box is a telephone company pedestal and wherein the step of severing further comprises the step of severing at a splice X pairs of telecommunications conductor wires from a telecommunications conductor cable extending from a central office
5 facility.

66. The method of Claim 65 wherein X is 25.

67. The method of Claim 64 wherein the step of selectively connecting further comprises the step of leaving corresponding ones of the second group of X pairs of wires disconnected from ones of first group of X pairs of wires which are connected to a pair of customer service wires.

68. The method of Claim 67 wherein the step of selectively connecting further comprises the step of connecting corresponding ones of the second group of X pairs of wires to ones of first group of X pairs of wires which are not connected to a pair of customer service wires.

69. A telecommunications terminal block for making and breaking connections with a telecommunications conductor, said terminal block comprising:

- a base having a first connector and a second connector mounted therein;
- a first conductor extending from the base, the first conductor being
- 5 electrically connected to the first connector;
- a second conductor extending from the base, the second conductor being electrically connected to the second connector; and
- means for electrically connecting a service wire connector to the first conductor and for interrupting the electrical connection of the first connector and
- 10 the second connector when the first conductor is connected to the service wire connector and means for electrically connecting the first connector and the second connector when the first conductor is not connected to the service wire connector.

70. A telecommunications terminal block for making and breaking connections with a severed telecommunications conductor, comprising:

- means for connecting to a first end and a second end of the severed telecommunications conductor; and
- 5 means for connecting the first end to a customer service wire and disconnecting the first end from the second end when the first end is connected to the customer service wire and for connecting the first end and the second end when the first end is not connected to the customer service wire.

**TERMINAL BLOCKS AND METHODS FOR MAKING AND BREAKING
CONNECTIONS IN TELECOMMUNICATIONS CONDUCTOR LINES**

Abstract of the Disclosure

In embodiments of the present invention, telecommunications terminal blocks are provided for making and breaking connections between a first telecommunications conductor, a second telecommunications conductor and a service wire. The terminal block includes a housing having a first connector connected to the first telecommunications conductor and a second connector connected to the second telecommunications conductor mounted therein. A first conductor is provided in the housing, the first conductor being electrically connected to the first connector and having a service wire connector portion configured to receive the service wire. A switch electrically connects the first connector and the second connector, the switch having a first state wherein the first connector is electrically connected to the second connector and a second state wherein the first connector is electrically disconnected from the second connector. Methods are also provided.

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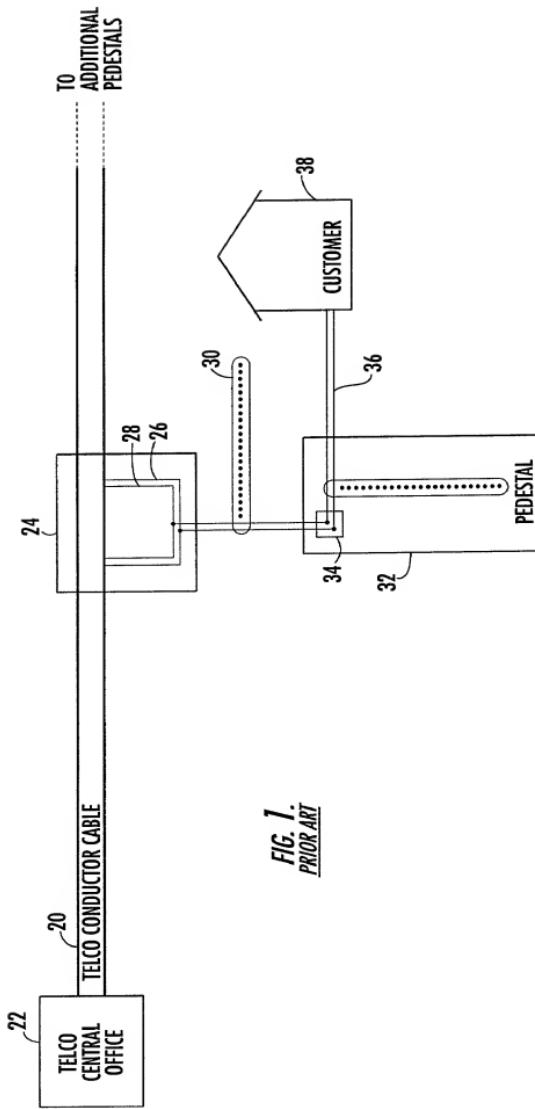
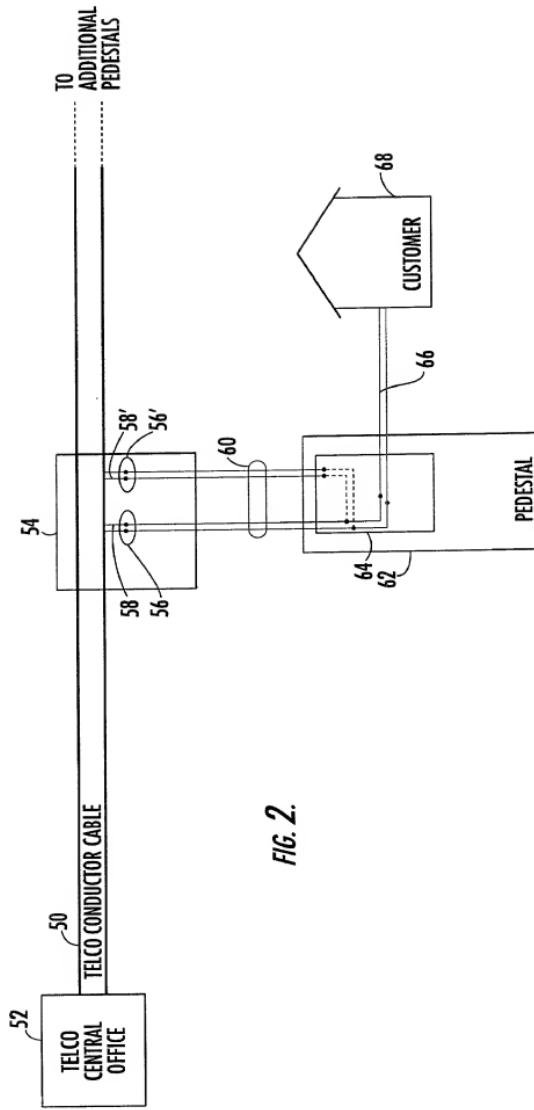


FIG. 1.
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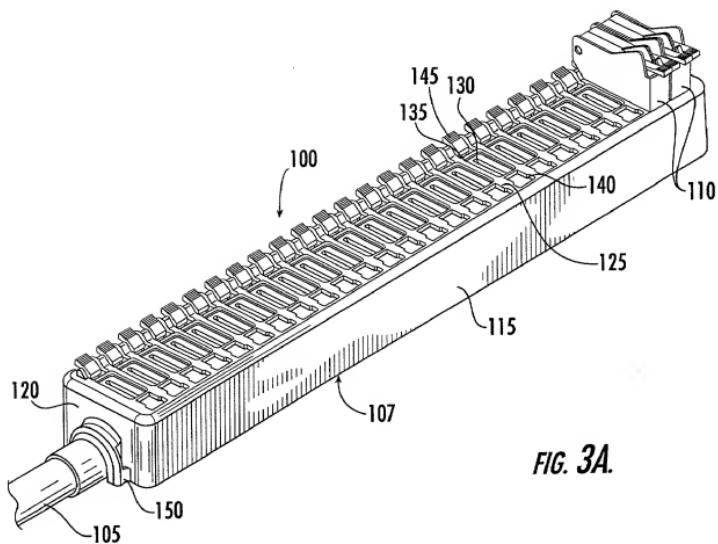


FIG. 3A.

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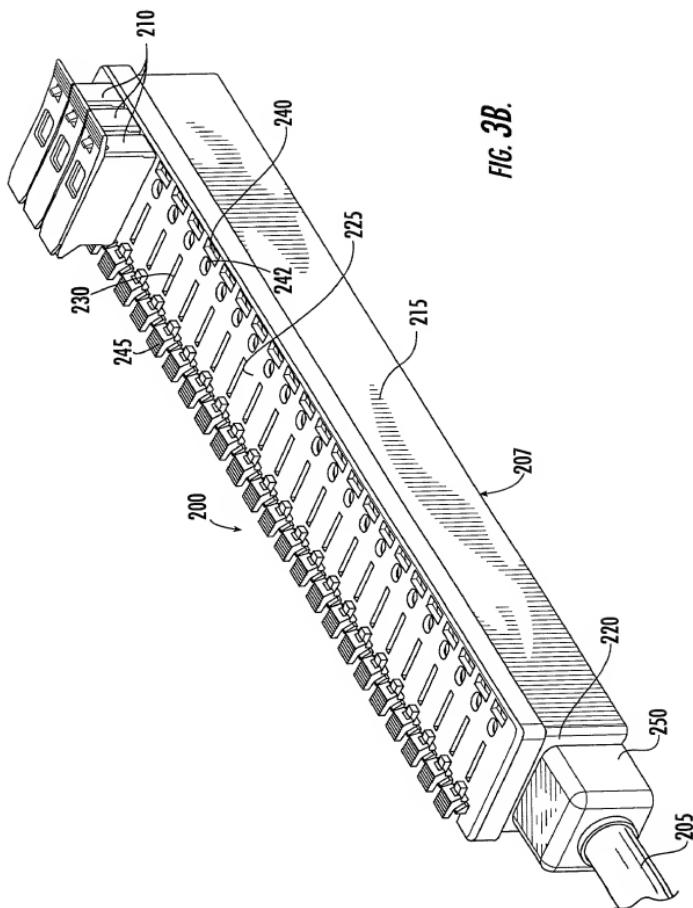
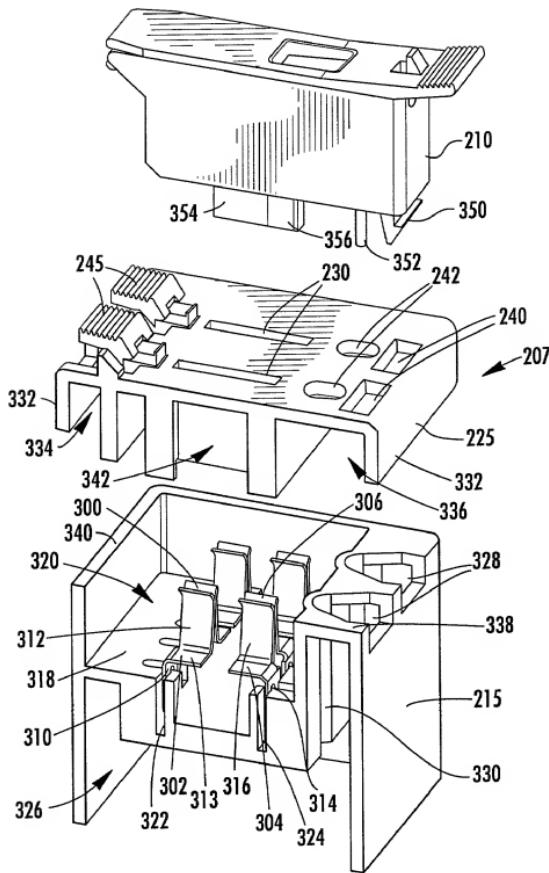


FIG. 4.



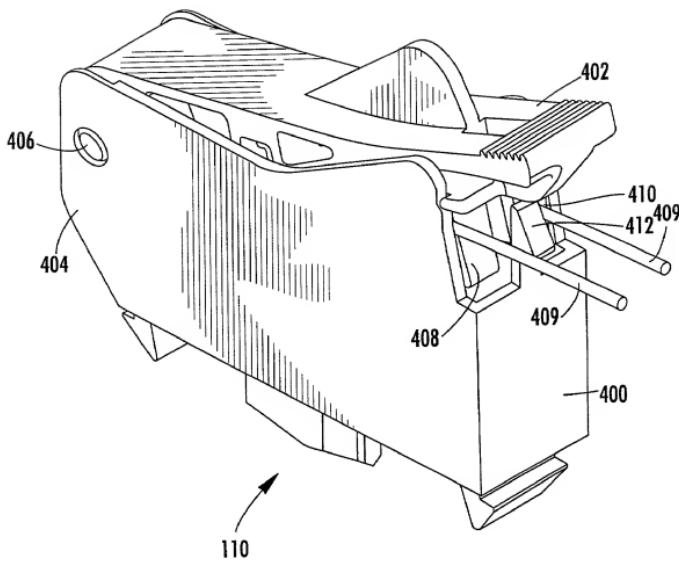


FIG. 5A.

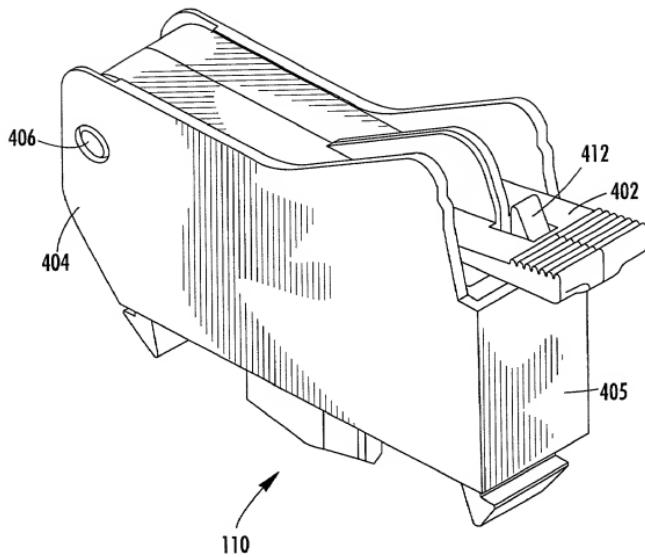


FIG. 5B.

FIG. 6.

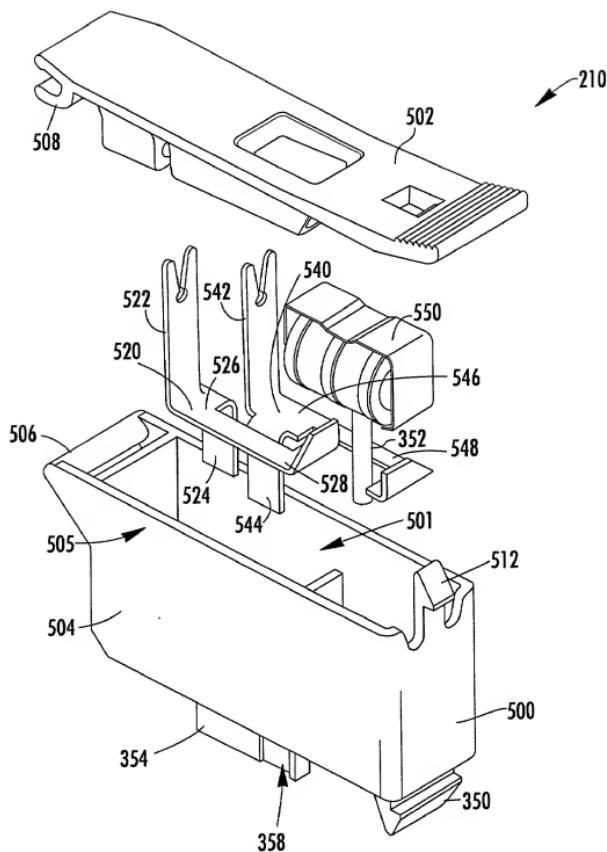
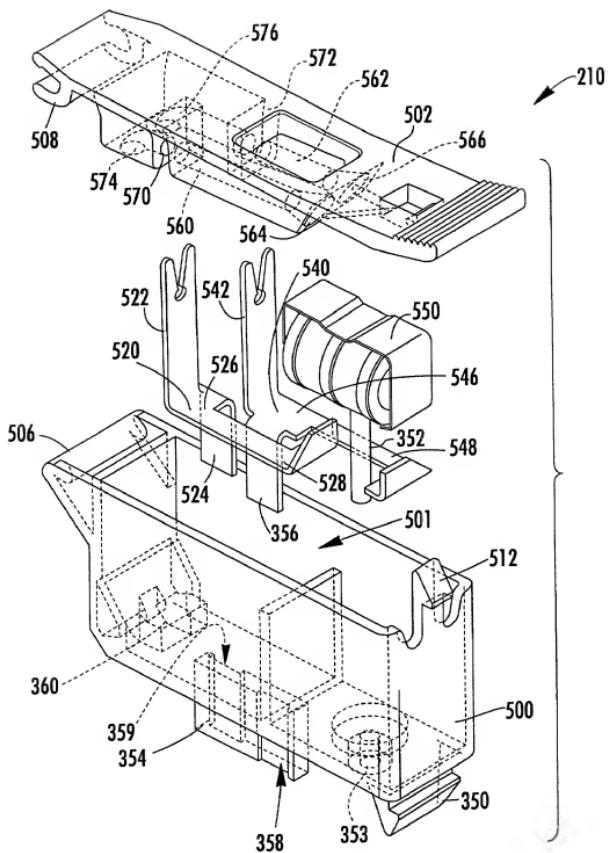


FIG. 7.



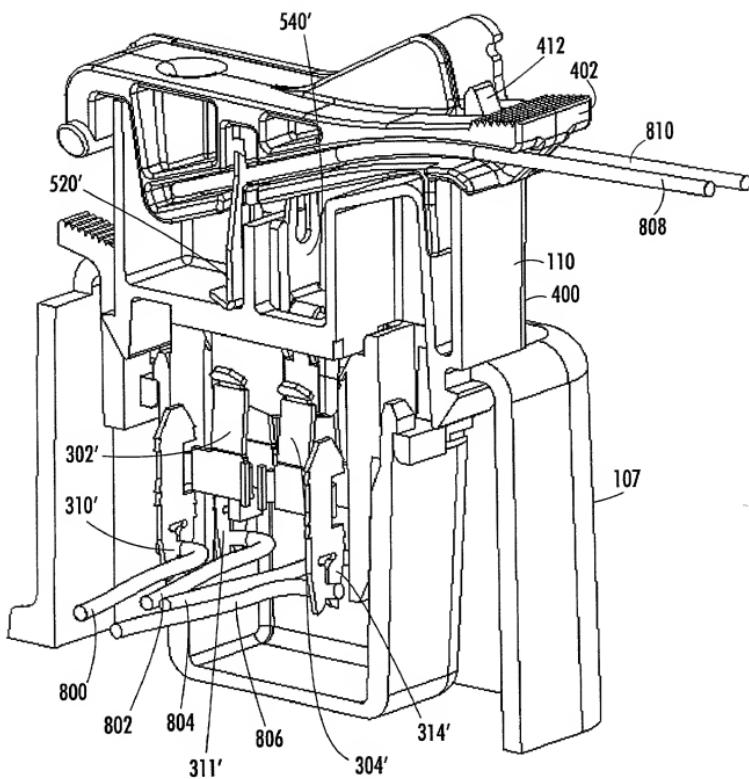


FIG. 8A.

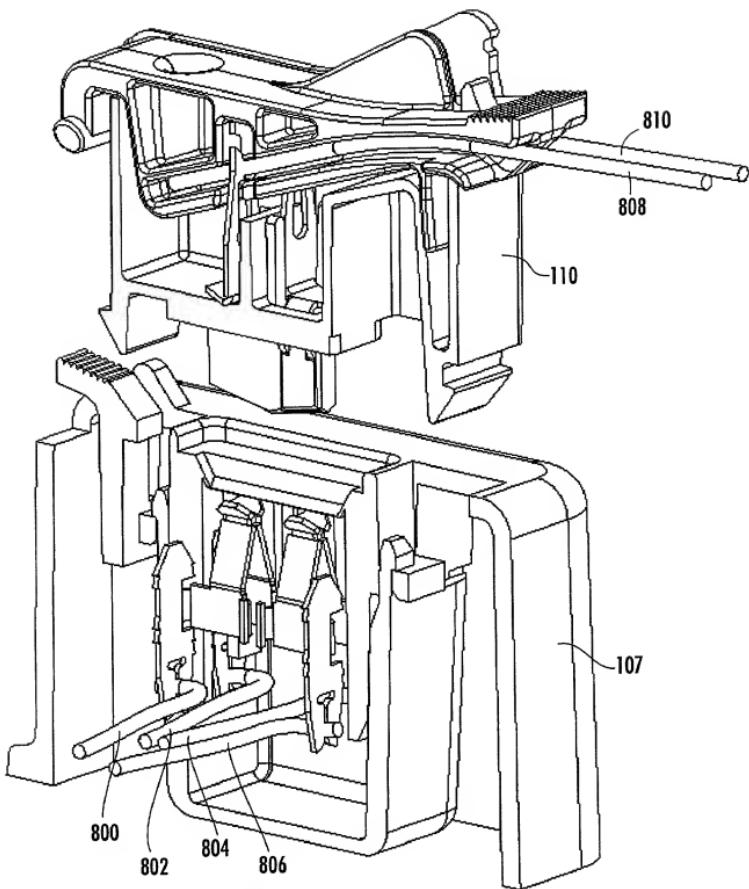


FIG. 8B.

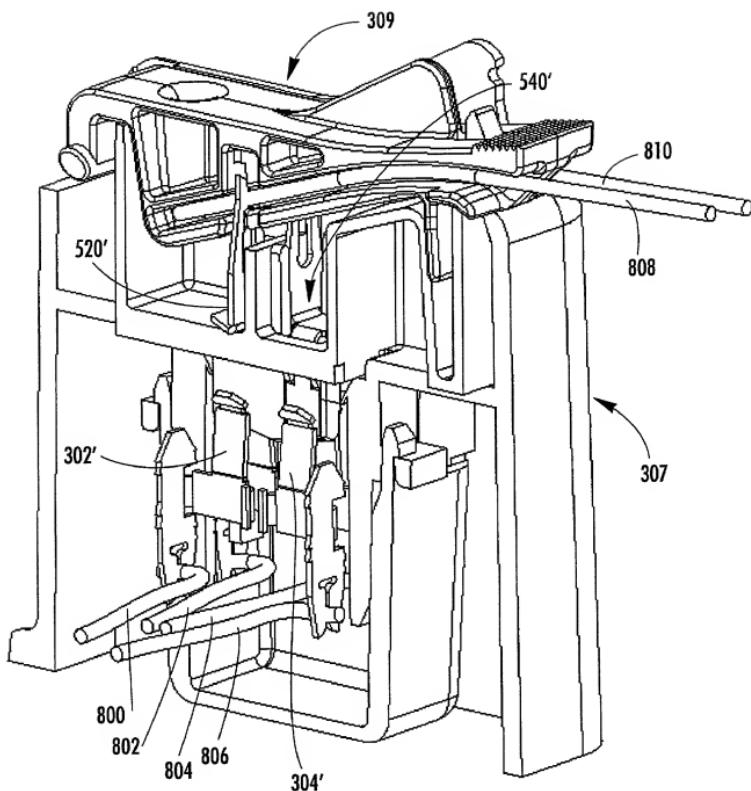


FIG. 9A

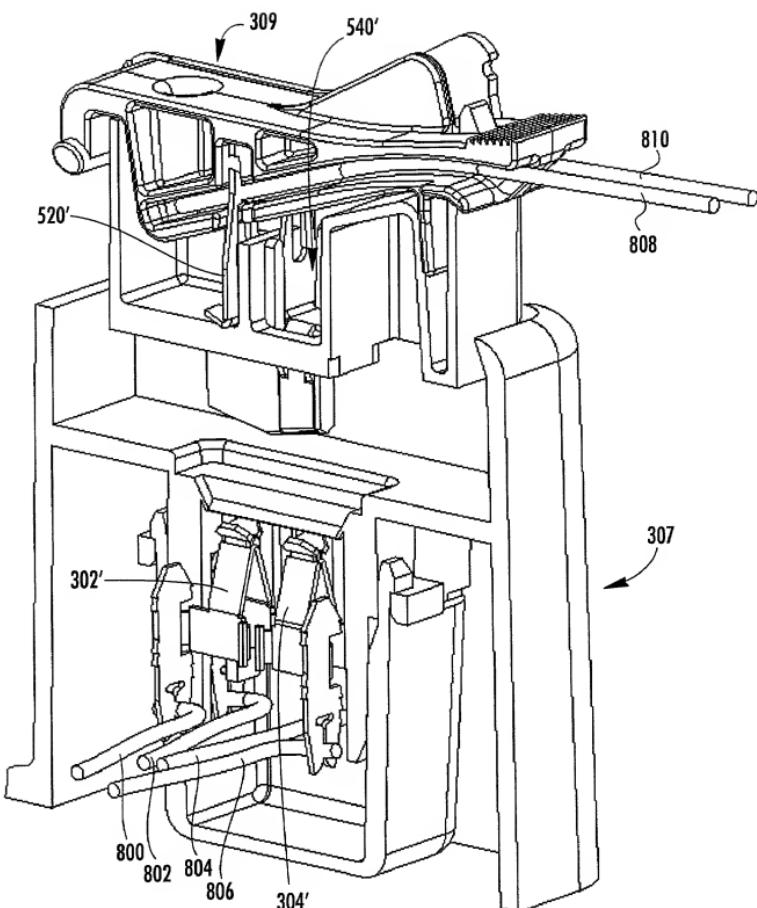


FIG. 9B

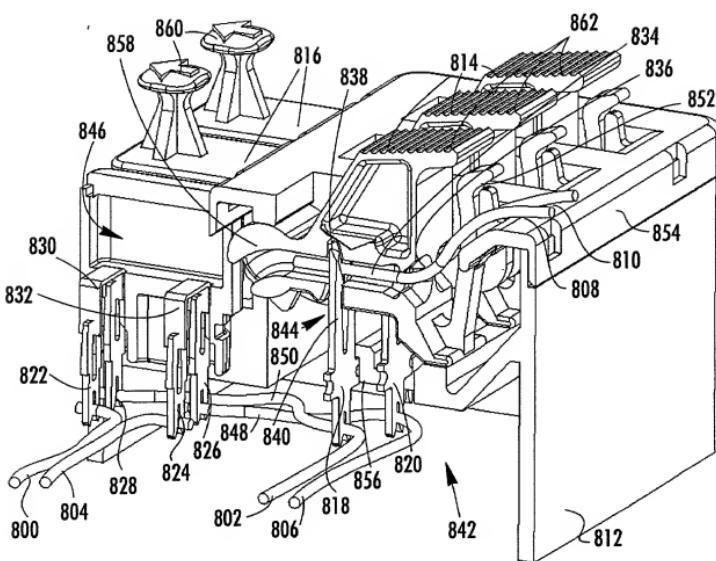
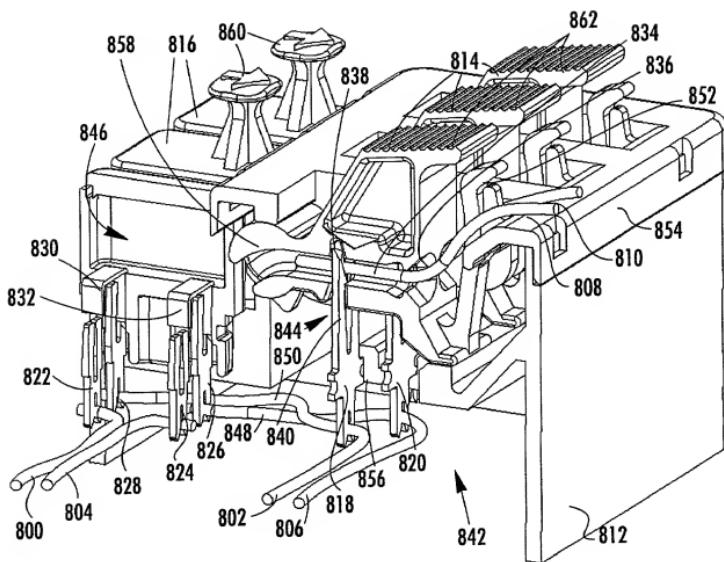


FIG. 10A



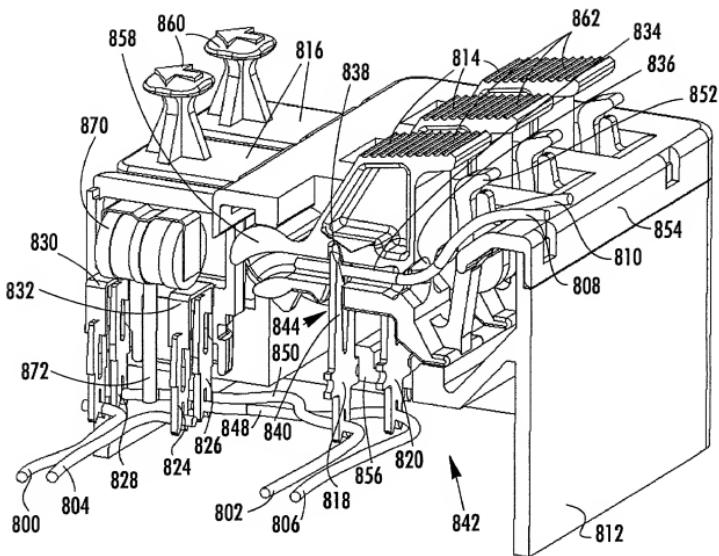


FIG. 11A

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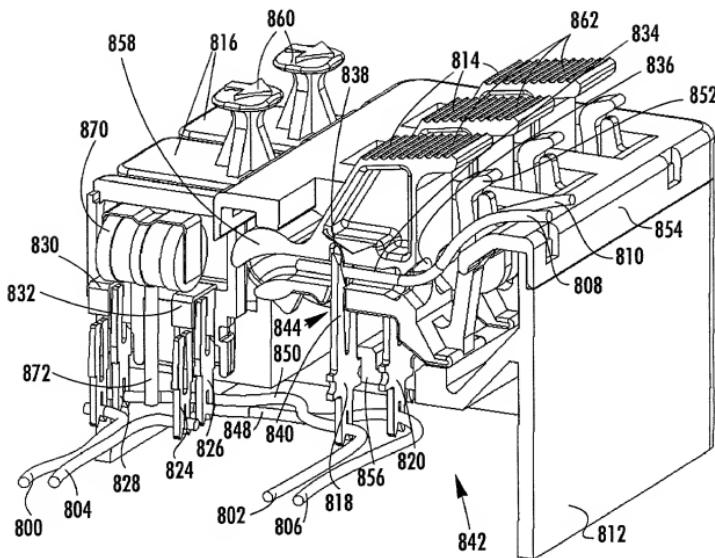


FIG. 11B

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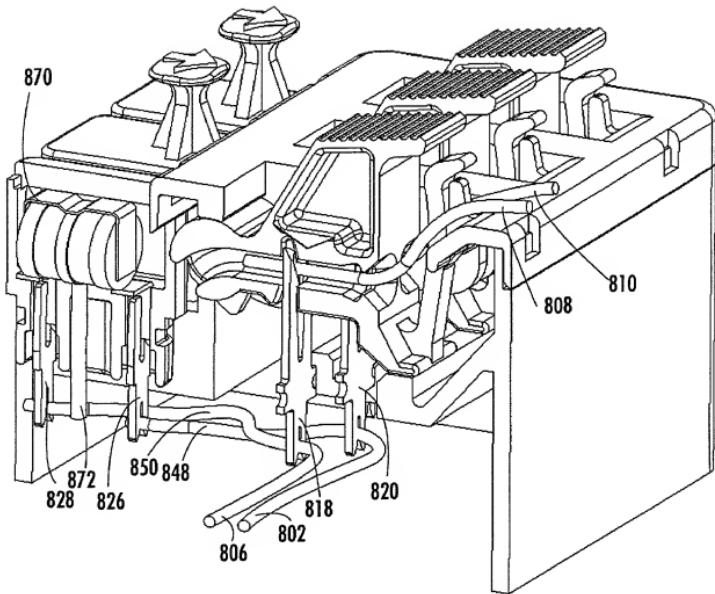


FIG. 12

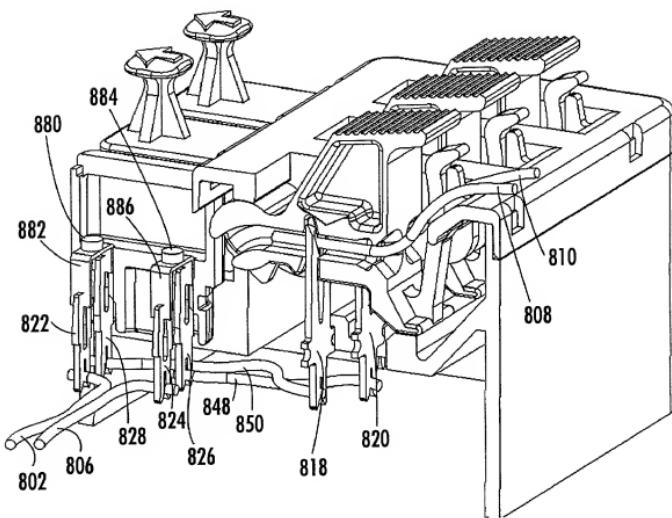


FIG. 13

FIG. 14.

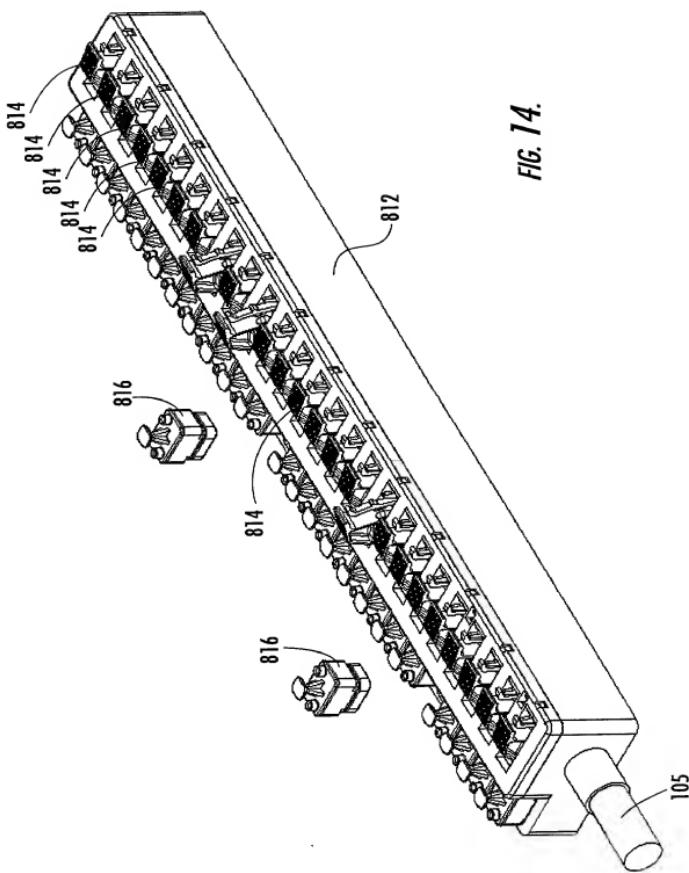


FIG. 15.

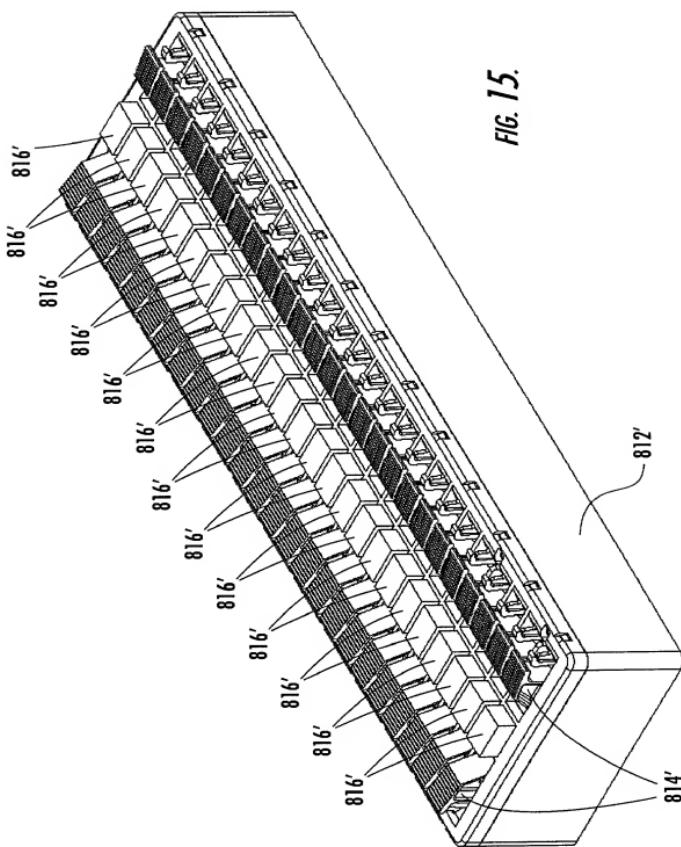
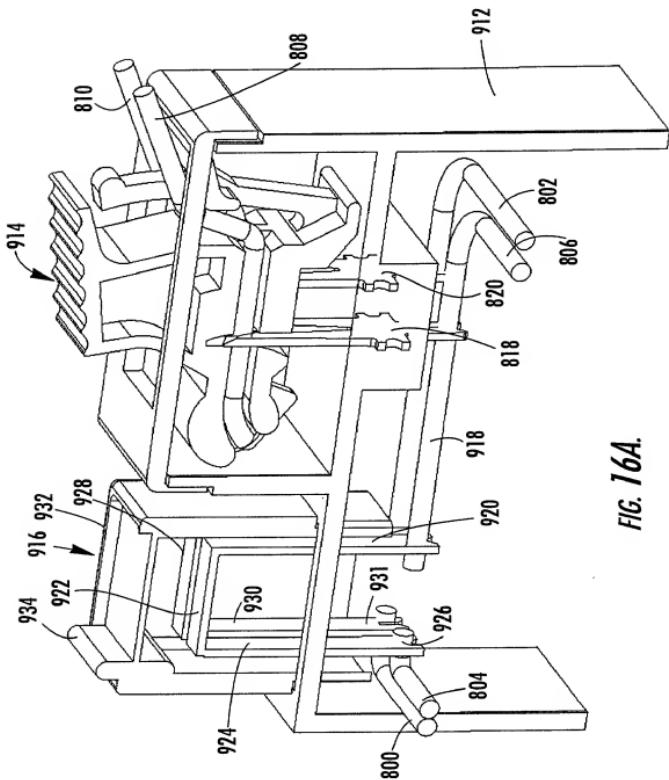


FIG. 16A.



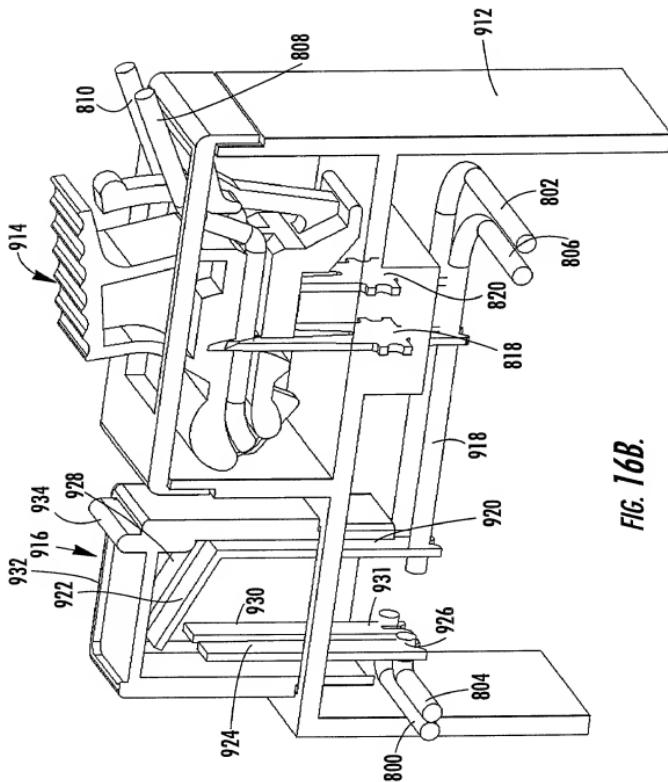


FIG. 16B.

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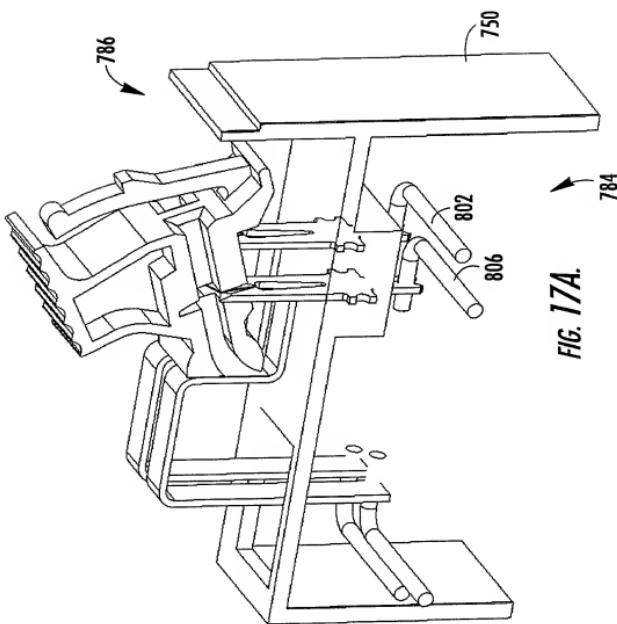
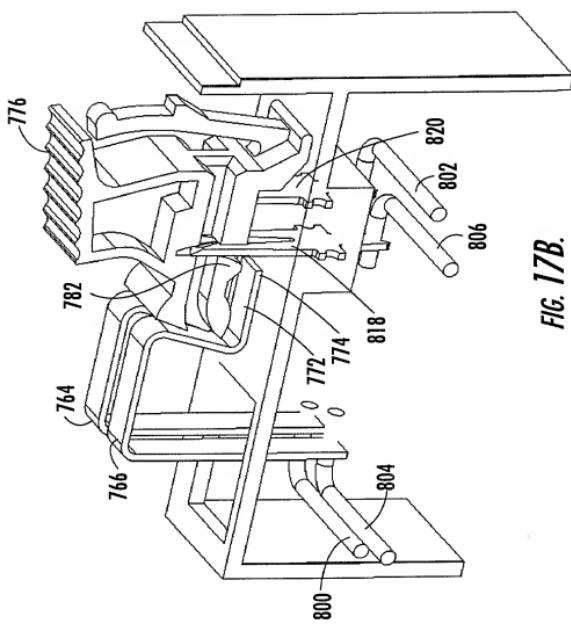


FIG. 17A.

FIG. 17B.



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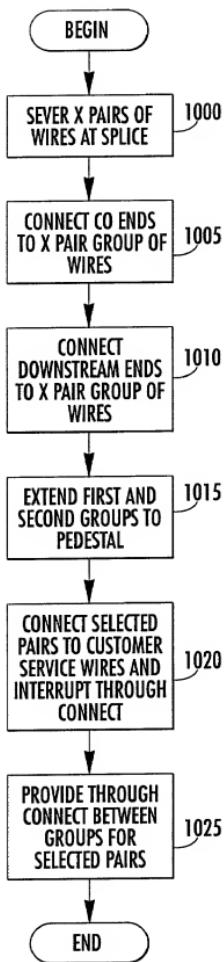


FIG. 18.

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

Attorney Docket No. NC056-US1/5487-81

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **TERMINAL BLOCKS AND METHODS FOR MAKING AND BREAKING CONNECTIONS IN A TELECOMMUNICATIONS CONDUCTOR**,

the specification of which

[] is attached hereto

OR

[] was filed on as United States Application No. or PCT International Application Number and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37 Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate, or of any PCT International application having a filing date before that of the application on which priority is claimed.

None			[<input type="checkbox"/>] Yes [<input type="checkbox"/>] No
Number	Country	MM/DD/YYYY Filed	Priority Claimed
			[<input type="checkbox"/>] Yes [<input type="checkbox"/>] No
Number	Country	MM/DD/YYYY Filed	Priority Claimed

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

None	
Application Number(s)	Filing Date (MM/DD/YYYY)
Application Number(s)	Filing Date (MM/DD/YYYY)

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) or § 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application (37 C.F.R. § 1.63(d)).

Appln. Serial No.	Filing Date	Status Patented/Pending/Abandoned
Appln. Serial No.	Filing Date	Status Patented/Pending/Abandoned
Appln. Serial No.	Filing Date	Status Patented/Pending/Abandoned

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following registered attorney(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

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